AN INDUSTRIAL PUBLISHING CORPORATION MAGAZINE

OCTOBER, 1957

Precision Metal Molding

PMM

INCLUDING DIE CASTINGS MAGAZINE

DIE CASTINGS

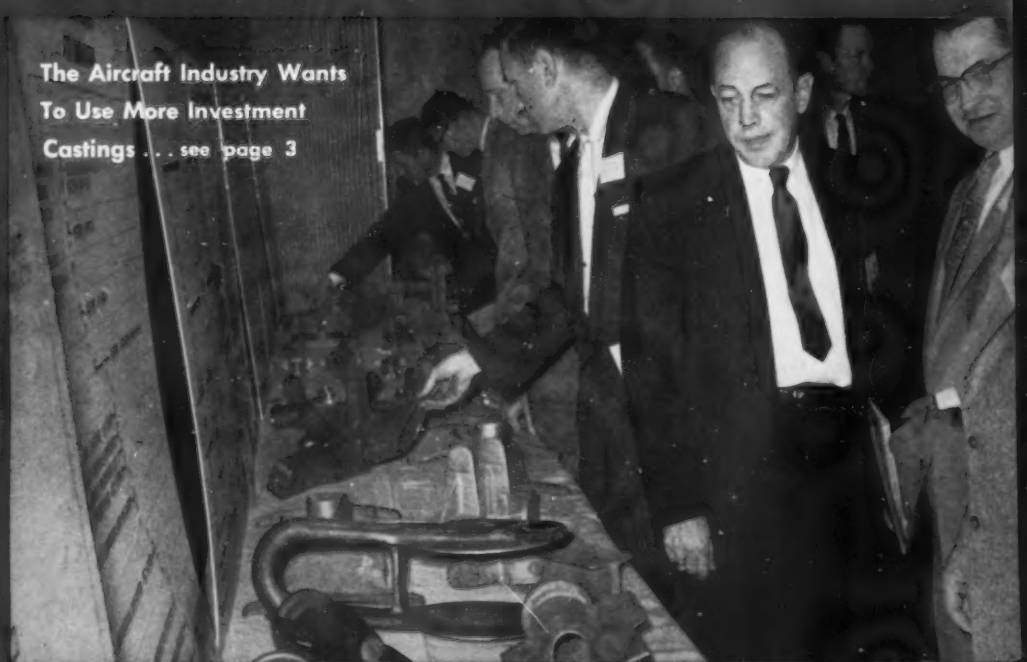
INVESTMENT CASTINGS

PERMANENT MOLD CASTINGS

PLASTER MOLD CASTINGS

POWDER METALLURGY

SHELL MOLD CASTINGS



The Aircraft Industry Wants To Use More Investment Castings . . . see page 3

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ZINC BASE DIE CASTING ALLOYS

CERTIFIED uniform high-quality ingot can help you make better castings at high production speeds.

- All ingot is production controlled under the most modern methods to insure purity.
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Here's a natural for shops doing small and medium size castings

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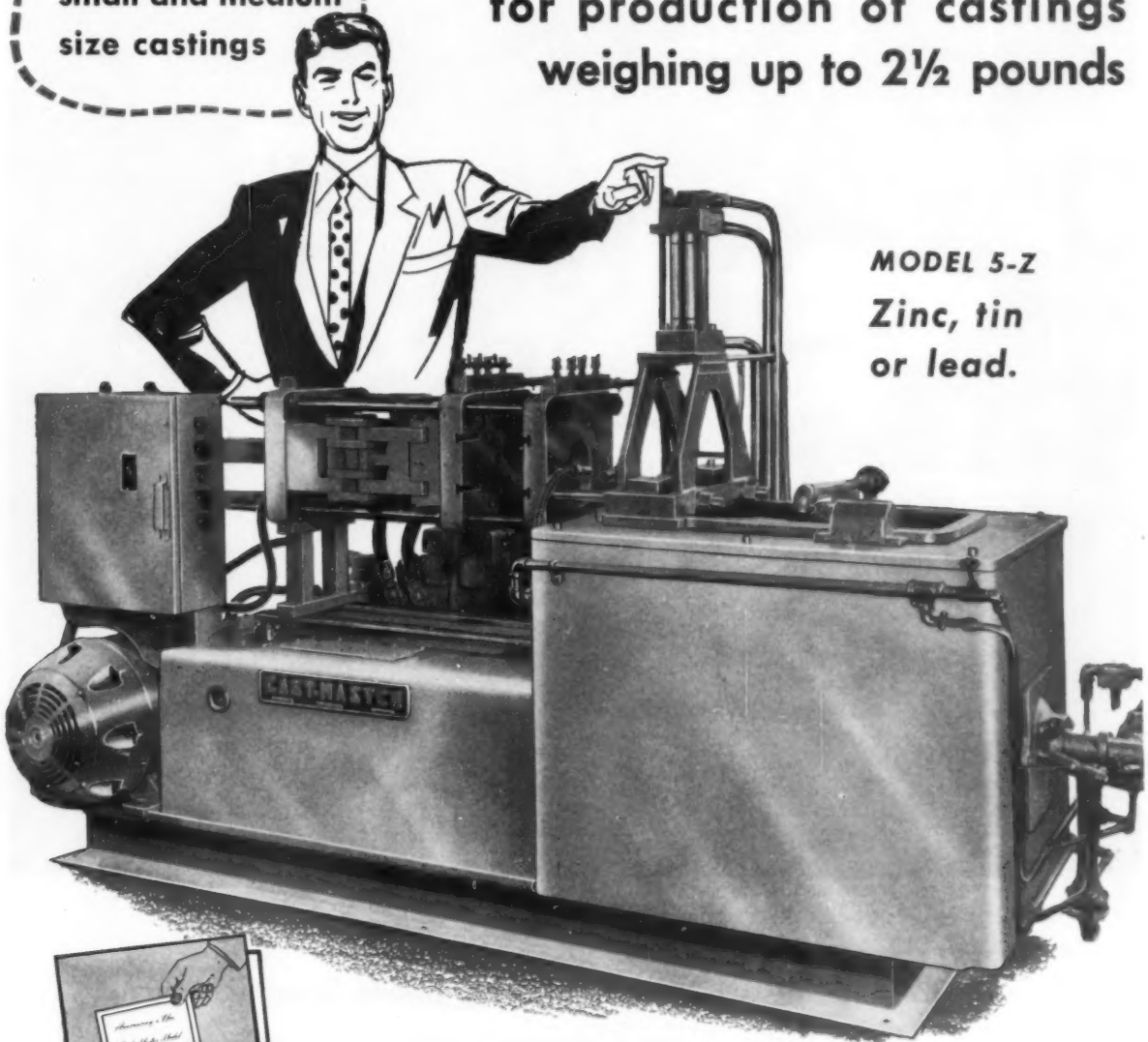
for production of castings weighing up to 2½ pounds



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Yes, the new Cast-Master Model 5Z is a natural for any die casting shop which specializes in small and medium size work, or as a supplementary machine for handling small dies. The Model 5Z embodies many of the exclusive efficiency-producing features of the larger Cast-Master models, and is capable of producing mirror smooth, hardware finish castings at a high rate of speed. Write today for specifications and complete information.

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COVER STORY

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6 ways

to assure good surfaces on shell-molded castings

Smooth castings that require a minimum of finishing are a major advantage of shell molding. Don't lose it through surface roughness that may cause otherwise sound castings to be rejected. Here are six ways to assure good surfaces on shell-molded castings:

1. Pour at the correct temperature. Usually, the lowest permissible pouring temperature results in the smoothest surface.

2. Check for poorly filled shells. Low density shells often cause roughness.

3. Avoid nozzle ingates. Increase ingate areas or choke the runner system.

4. Avoid metal inclusions. Keep runners full at all times, especially with drossing and high temperature alloys.

5. Position horizontally. This reduces metallostatic head, thus decreases tendency of metal to penetrate shell.

6. Check sintering point and grain size distribution of sand.

One thing more. Use a top-quality resin. G-E resins are preferred by many foundries for their good flow properties, fast cure, fine particle size and excellent release properties. Try them. And write today for a helpful brochure, "59 Answers to Your Shell Molding Problems". GENERAL ELECTRIC COMPANY, Section PM-5, Chemical Materials Department, Pittsfield, Mass.

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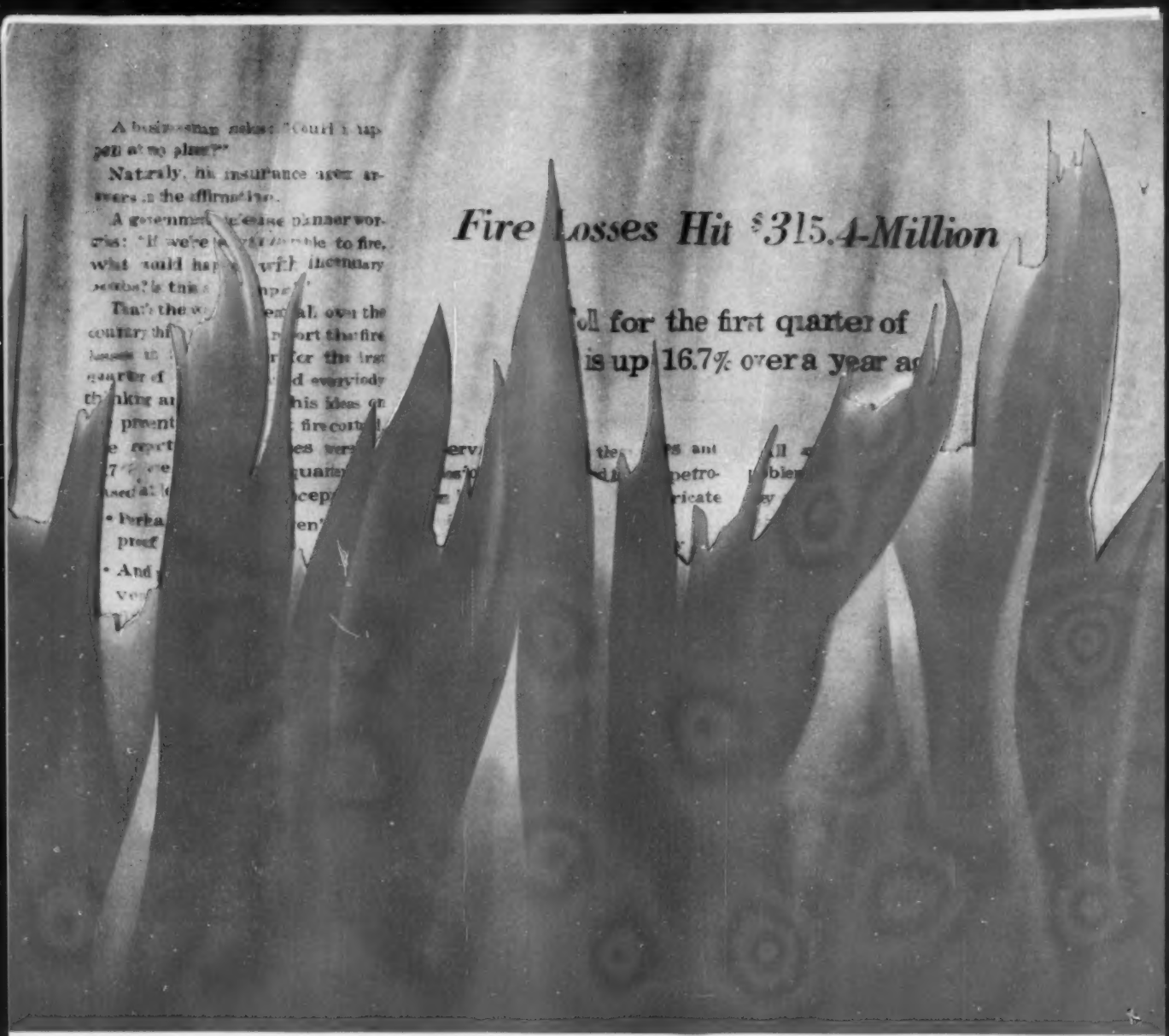

Plan against it . . . not for it!

Cellulube fire-resistant hydraulic fluids and synthetic lubricants open up new areas of in-plant fire prevention

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Cellulube fire-resistant hydraulic fluids and synthetic lubricants are good examples. In hydraulic equipment, they reduce the danger of uncontrollable fire caused by line breaks or other failures when flammable fluids are in use. In air compressors, these non-petroleum oils not only prevent excessive carbon formations—the main source of fire and violent explosion—but also meet the severest of lubrication requirements.

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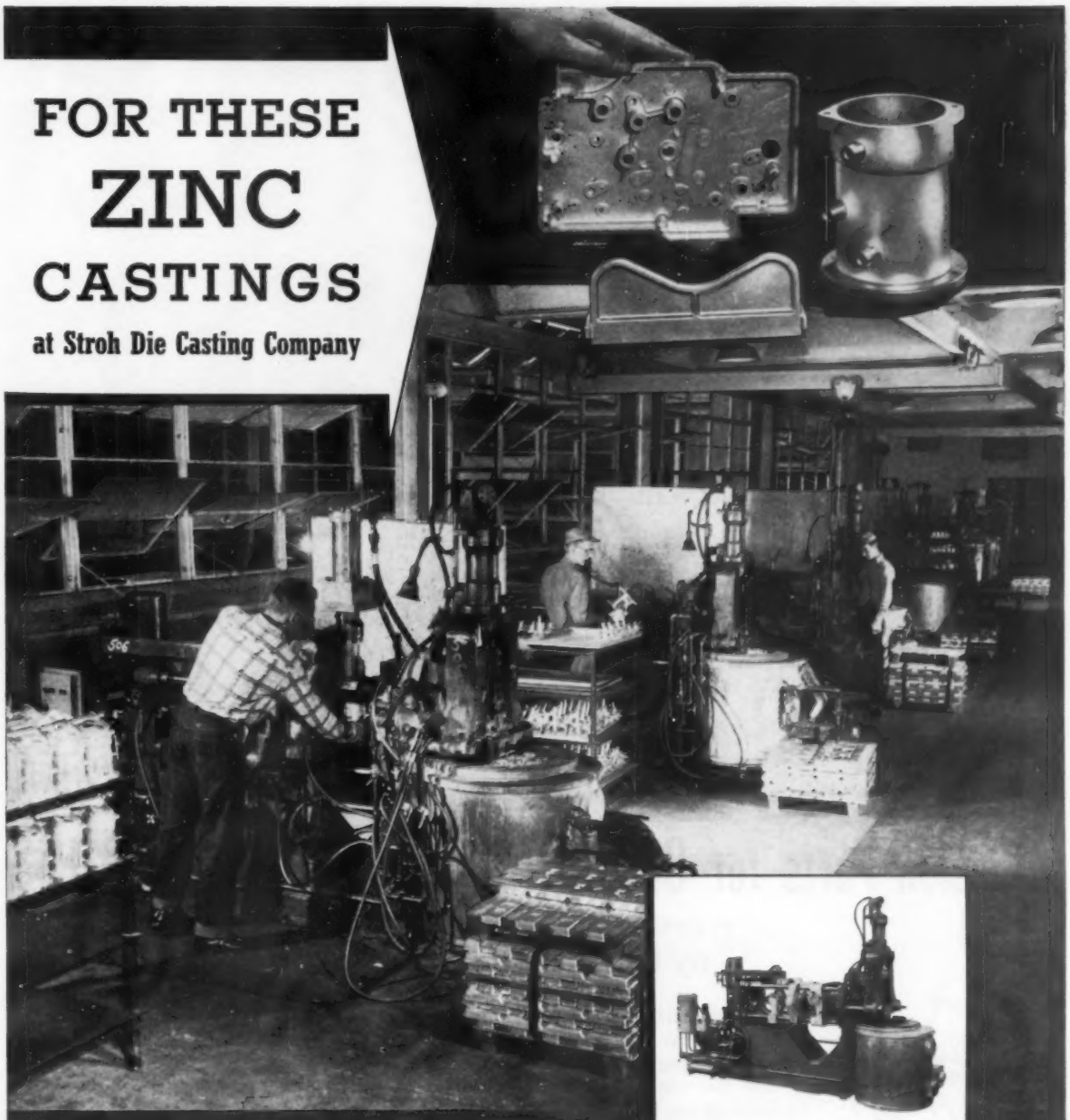
FOR THESE ZINC CASTINGS

at Stroh Die Casting Company



"YOU CAN'T BEAT THE 100 TON LESTER"

George Meier, General Manager of Stroh Die Casting Company, says:

> "For steady, dependable production on these die castings you can't beat the little 100 Ton Lester. Not only did we have a low initial investment, but maintenance costs have been surprisingly low during the entire eight years we've been using them."

The HHP-2-ZE includes among its features the famous Lester "one-adjustment" Zinc End and Central Die Height Adjustment. If you want to learn more about this rugged machine that can cast up to 6 pounds of zinc or make from 400 to 500 shots per hour, write today for Bulletin 101.

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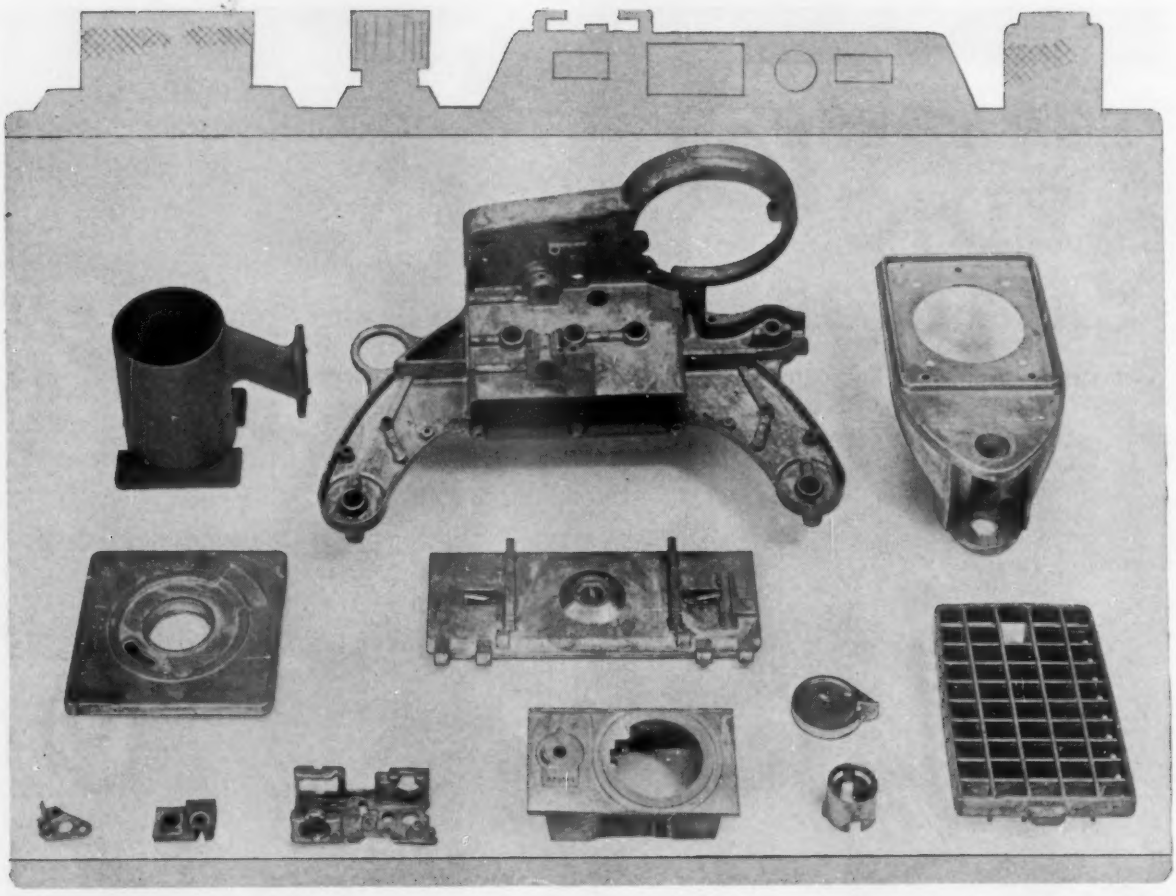

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--produced in high volume, at low cost by DOLLIN Die-Casting Techniques

Today's cameras, projectors and optical equipment are outstanding examples of how low-cost, versatile die-castings can contribute compactness, light weight, precision, serviceability and appearance—and help reduce prices to bring the fun of photography within reach of every family.

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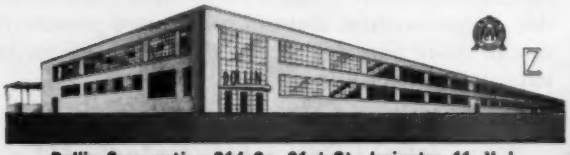

Send prints or samples of any parts for cost-cutting suggestions and quotation. Engineering advice without obligation.

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Photo by Hedrich-Blessing

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of **DIE CASTING DIE STEELS** from warehouse stocks

...every piece ultrasonically inspected

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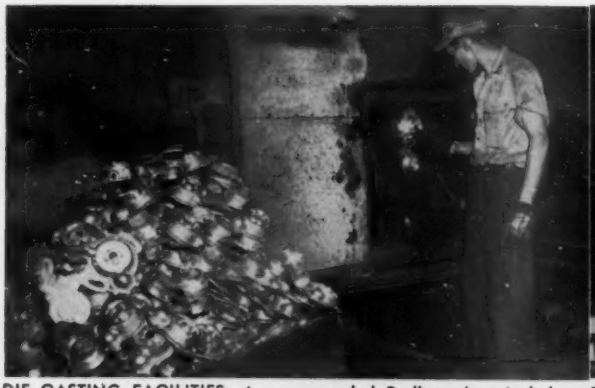

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THE PRODUCTION LINE in our die casting plant includes a range of machines from 250 to 800 tons to make your castings at the lowest cost.

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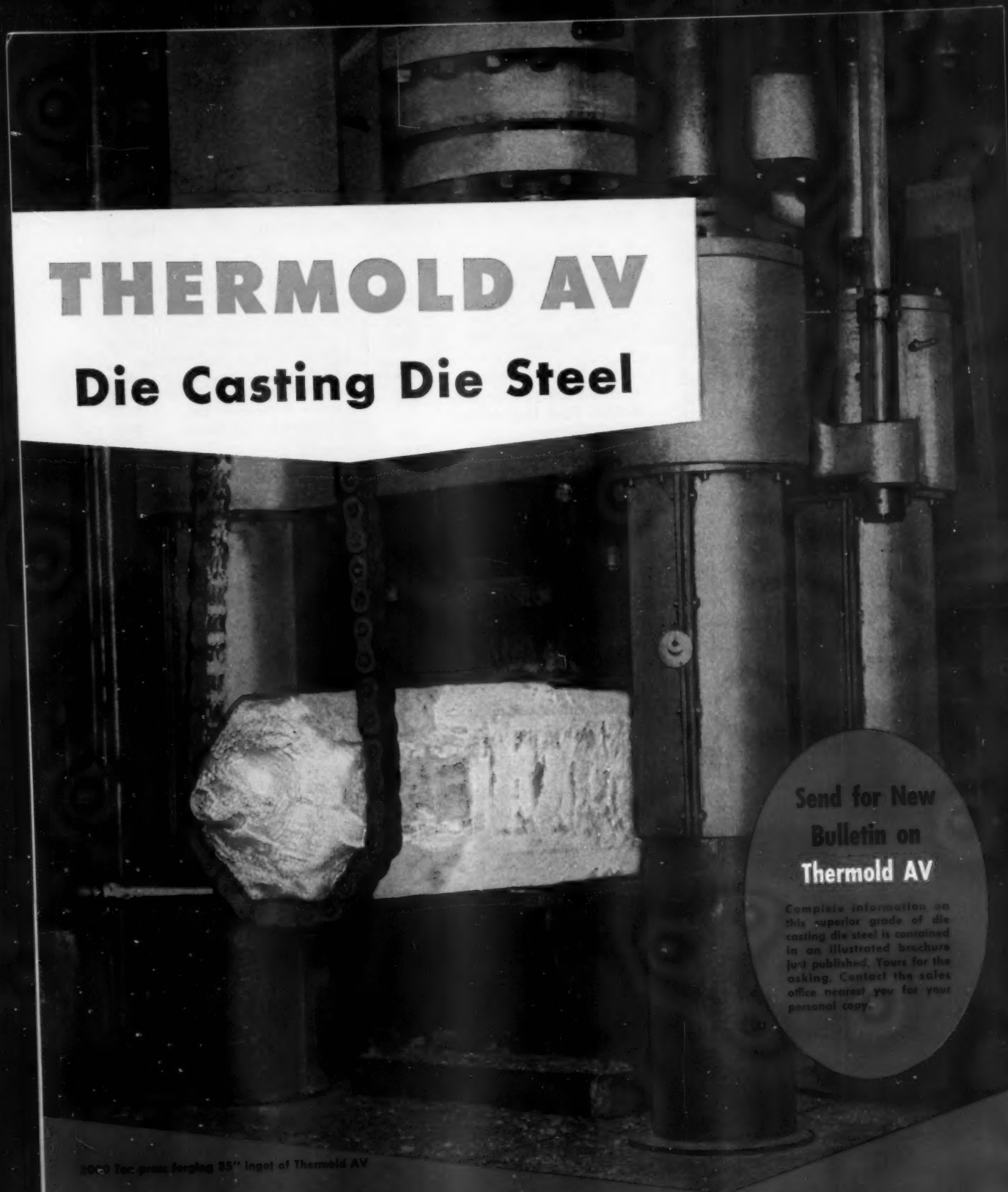

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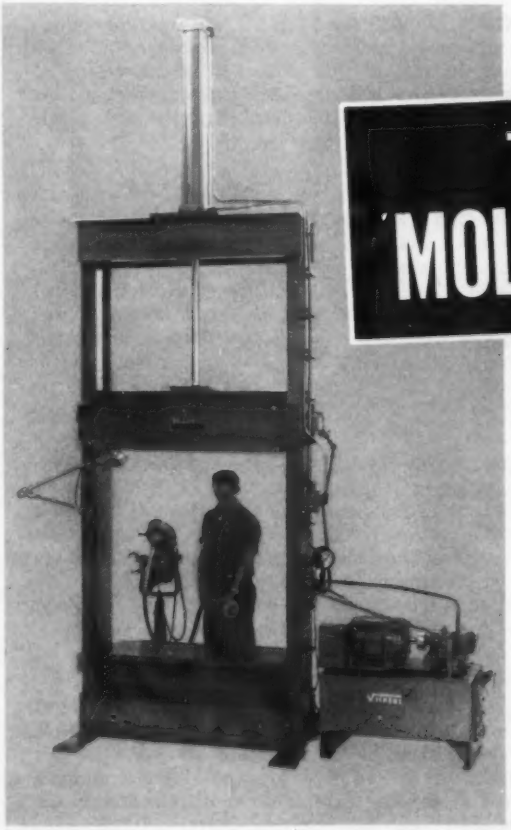
Metal Powder Assoc'n	Palmer House						v	
Am. Soc. for Metals (Technical Papers)	Palmer House			v	v	v	v	
Am. Soc. for Metals (Educational Lecture series)	Palmer House			v	v			
Am. Soc. for Metals (Plutonium Confer.)	Palmer House			v	v	v	v	
Am. Soc. for Metals (Liquid Metals and solidification)	Palmer House	v	v					
Am. Soc. for Metals (International Panel Discussion)	Hotel Sherman			v	v	v	v	v



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MOLD SPOTTING PRESS

SAVE MAN HOURS AND DELIVERY TIME

Now one man with little effort can open and close a heavy die and save his energy for the more important work of fitting.
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THE PALFY DIE & MOLD CO.
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SHADYSIDE 9-1979

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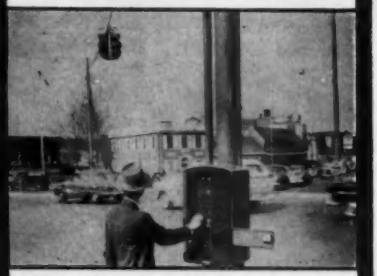
TCB = ?
TCB = HB



Problem: What method can best be employed to cast our large Traffic Control Box . . . and who can satisfy our exacting requirements?

Solution: Aluminum Permanent Mold Casting . . . by Hampden Brass & Aluminum Co.

This was the solution Eastern Industries, Inc. found to their problem of housing the delicate "brain" of their radar traffic control system.

Pictured here is the end result . . . a non-corrosive, uniquely weather-proof, snug-fitting box, completely safe from tampering.

The permanent mold process was chosen by Hampden because it produces a fine, non-porous casting . . . the surface requiring no preparatory finishing before painting. The box was used as cast, thereby eliminating expensive profile machining for producing the rabbet fit of the box and doors. The high production rate and lower over-all cost of the permanent mold process prove additional advantages. Aluminum was selected for its lightweight and durable qualities.

Remember . . . whether your casting problems are big, tiny, intricate, or special . . . Hampden is ready to effectively solve them with premium quality castings of aluminum or other non-ferrous metals . . . utilizing the sand, permanent mold or die casting method. Our more than 50 years' know-how is your assurance of the best casting techniques to help reduce costs and improve performance.

Why not contact Hampden Brass & Aluminum Co. on your next casting problem . . . and avail yourself of our engineering counsel?

Send for brochure, "Behind the Scenes" . . . complete digest of Hampden's experience, equipment and facilities.

HB

HAMPDEN BRASS AND ALUMINUM CO.

Established 1903

262 Liberty St.•Springfield, Mass.

Producers of Sand, Permanent Mold, Die & Fiberglas Castings

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PMM BETWEEN THE LINES

the editor's viewpoint on articles in current and forthcoming issues

FOR BUSY READERS: If you read everything that crosses your desk, chances are you'd never have time to do your job. You're a busy man. PRECISION METAL MOLDING is edited for busy readers. The emblem above and on our cover symbolizes the way we are giving you more value for your reading time. Distilled Writing boils off every article's extra words. Result: you get facts in shorter, clearer, brighter style. They aren't article digests: they're complete . . . just distilled. Your reading time goes farther when you read PRECISION METAL MOLDING: since each article is shorter, you get more articles in each issue. You'll find 16 in this copy plus 5 departments. More articles, more easily read articles: that's Distilled Writing. Let us know how you like it.

WHAT THE RUSSIANS ARE DOING ABOUT DIE CASTING is revealed in the translation of a paper given by a Soviet representative at an international die casters' meeting in Paris this Summer. It is published by PMM as part of a report on European die casting, beginning on page 36.

MECHANIZED FINISHING OF DIE CASTINGS, an important trend in the metal finishing industry, is documented by a series of case histories starting in this issue with a full report on mechanization of mechanical finishing, painting and plating by a Mid-western die caster. This detailed photo story starts on page 51.

VACUUM TECHNIQUES GET THE SPOTLIGHT in two articles this month: *Vacuum sintering,* its basic theory and practice, is covered in an authoritative article for the first time by a recognized leader in powder metallurgical research. Part I of this important article starts on page 44. *Vacuum plaster mold casting* techniques developed by a Chicago foundry are given their first reportorial coverage also in this issue, beginning on page 39.

PRECISION TEMPERATURE CONTROL is an inherent part of the precision metal molding industries. That's why PMM is devoting a major article to the subject in November. How temperature control affects die casting, powder metallurgy and investment castings, plus some of the techniques for achieving adequate control, will be discussed by prominent engineers in each field. Introduction to the subject will be written by a specialist in this type of instrumentation. Watch for it.

NEW DEVELOPMENTS TO LOOK FOR when you attend the Metal Show next month are tabulated and highlighted this month in a preview designed to be torn out and carried with you when you attend the Show. Turn to page 11 for a glimpse of what's ahead at the big exhibition of metals and metal working this Fall.

Two Important Announcements on VACUUM DIE CASTING from REED-PRENTICE

REED Announces Exclusive Rights to Vacuum Die Casting

In an agreement just concluded with David Morganstern, Vice-President of Nelmor Manufacturing Company, Reed-Prentice has been granted sole rights to existing patents on vacuum die casting equipment. Mr. Morganstern will work with REED as a consultant.

Now you can get vacuum die casting equipment — for both zinc and aluminum, as either original equipment or conversion units — as a REED exclusive. Contact your Reed-Prentice Sales Engineer today for full details.

REED Announces A New Aluminum Vacuum Die Casting Unit

The Vacufeed, a new vacuum die casting system for aluminum, features fully automatic feeding. This new unit gives you, with aluminum, all the advantages of thinner, stronger castings already proved by the zinc Vacucast system. The new Vacufeed is now being run experimentally on a production basis, and full details will be announced soon.

Your Reed-Prentice Sales Engineer can give you data and preliminary specifications on the new aluminum Vacufeed unit. Contact him today, or write to our main office in Worcester.

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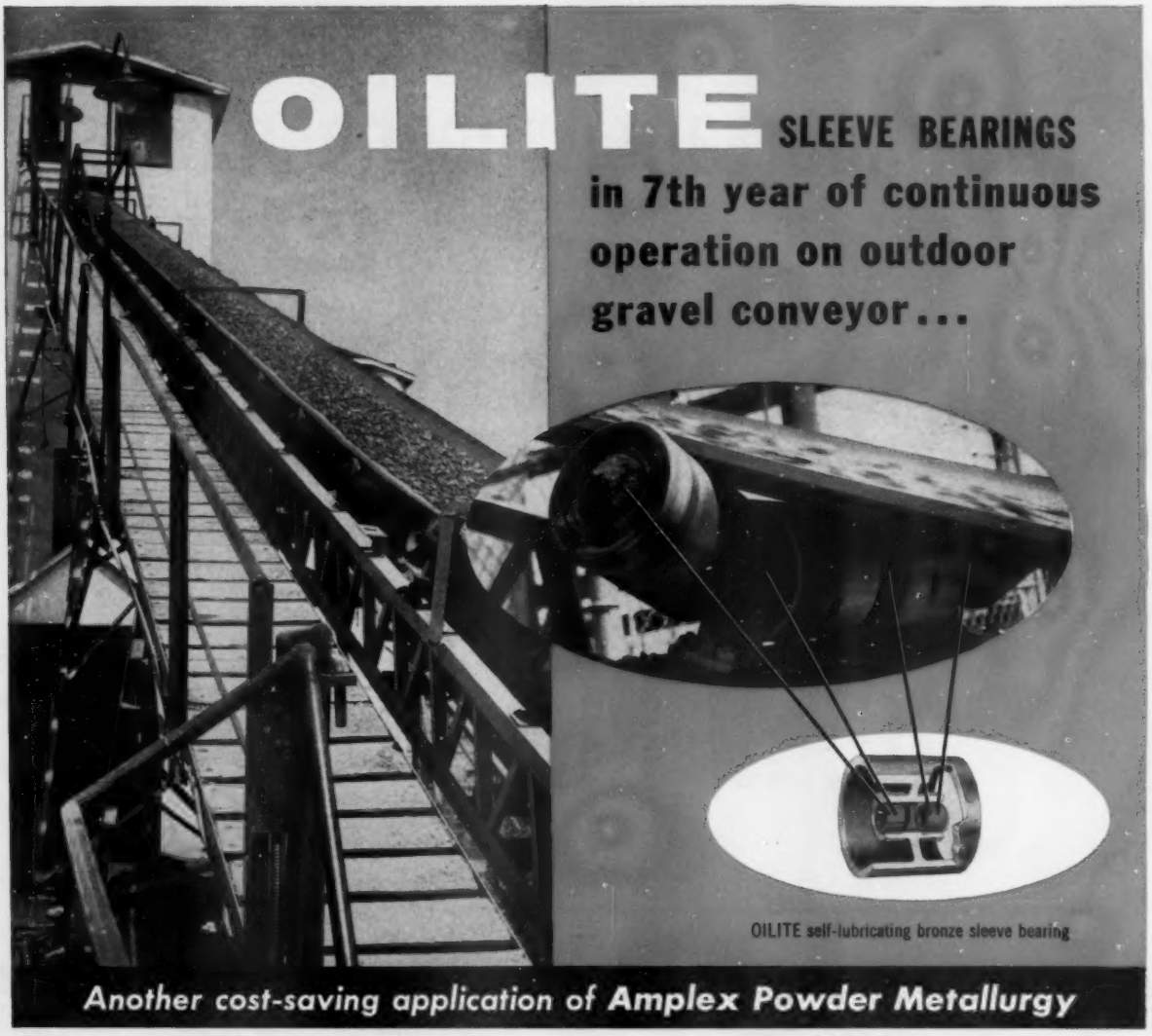
OILITE SLEEVE BEARINGS
in 7th year of continuous operation on outdoor gravel conveyor...
OILITE self-lubricating bronze sleeve bearing

Another cost-saving application of **Amplex Powder Metallurgy**

No seals protect these OILITE bearings from sand, gravel, grit. On the two center rollers, no additional lubrication is possible. Yet this OILITE-equipped outdoor conveyor has been in continuous operation under extreme weather conditions for seven years—*without replacing one OILITE bearing.*

That's some record! J. Cooke (Concrete Blocks) Ltd., of Aldershot, Ontario, one of Canada's largest producers of concrete blocks, operating twenty of these sand and gravel conveyors, has proved the long wearing, money saving qualities of OILITE bearings. No wonder all twenty conveyors are 100% OILITE equipped. The company says, "We wouldn't use any other kind."

What interests you? Longer product life—greater efficiency—lower cost? All three? Maybe Amplex has the answer.

Write for detailed information about Amplex powder metal components—OILITE Bearings, Parts, Filters. Or call your nearest engineering representative listed in the yellow pages under "Bearings—OILITE."

Representatives and dealers located in principal cities in United States and Canada.

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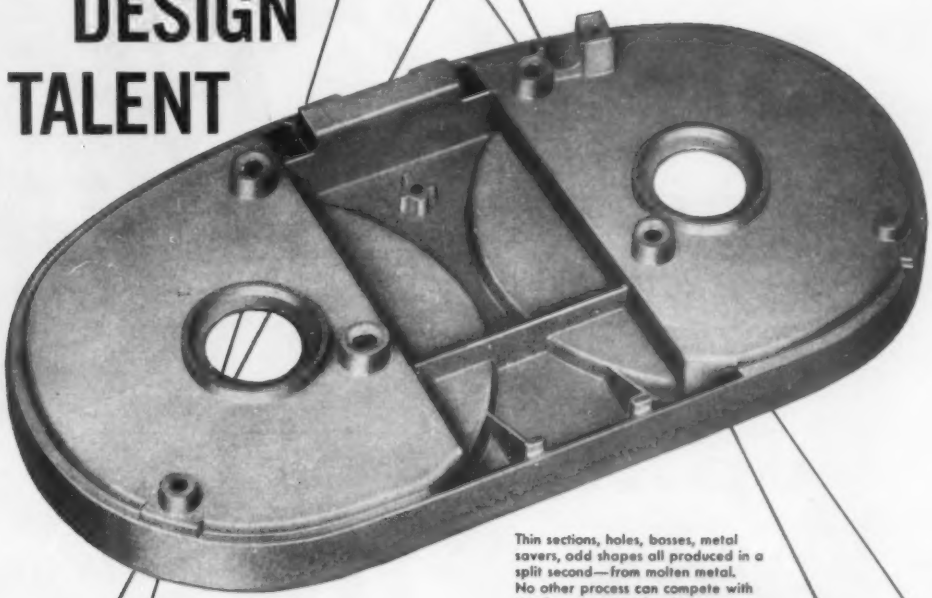
PYRAMIDING DESIGN TALENT



Thin sections, holes, bosses, metal savers, odd shapes all produced in a split second—from molten metal. No other process can compete with this for eye appeal or low cost.

with MADISON-KIPP zinc and aluminum die castings

When product designers send preliminary drawings for critical review by the seasoned Madison-Kipp mechanics, it has often proved to be the decisive factor in the ultimate design of the component parts.

The original designer thoroughly understands the function of his product. We thoroughly understand die casting and machining problems. Combining the two skills at an early period of development is logical and valuable.

Our customers of long standing always utilize this system which virtually pyramids design talent for successful high production manufacturing.

Please clip this ad as a reminder to contact us when you have die casting requirements.

kipp

MADISON-KIPP CORPORATION
213 WAUBESA STREET • MADISON 10, WIS., U.S.A.

• Skilled in Die Casting Mechanics • Experienced in Lubrication Engineering • Originators of Really High Speed Air Tools

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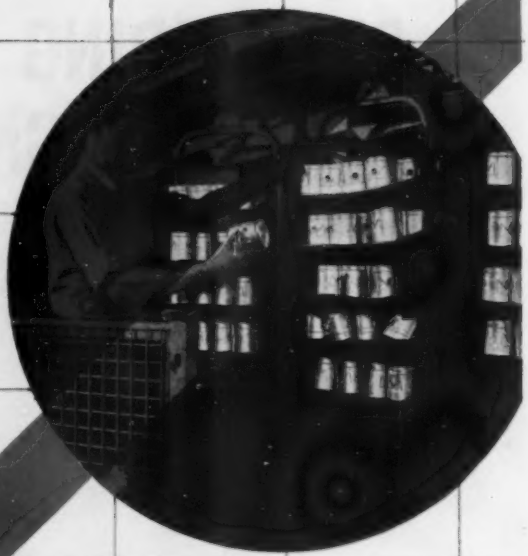
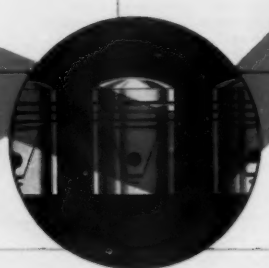


Castings production up... *from* 18 *to* 128

pieces per hour per man!

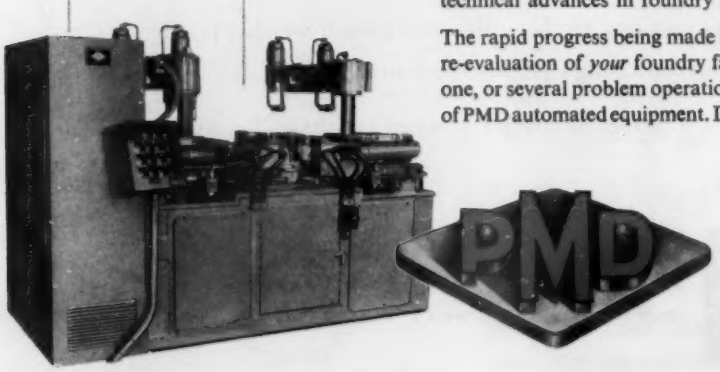


PMD AUTOMATED MOLDING EQUIPMENT MAKES THE DIFFERENCE

... and in your foundry operation—it could be the difference between profit and loss. Amazing production increases have been achieved in many foundry operations through the application of PMD automated machines and mechanized molding equipment. As one of the leading independent producers of tooling for light alloy molding and casting, PMD has worked closely with foundrymen in the development of automated foundry equipment.

Among these developments is the PMD AUTOMATED PISTON MOLDING MACHINE illustrated below. To provide increased output, lowered unit costs and higher quality castings, PMD applied its experience and engineering know-how to the problem. Result: an increase of over 600% . . . in less floor space, and with marked improvement in piston quality. This is typical of many technical advances in foundry automation pioneered by PMD.

The rapid progress being made in light alloy casting methods warrants careful re-evaluation of *your* foundry facilities and production potential. If you have one, or several problem operations, it will pay you to investigate the advantages of PMD automated equipment. Discuss your requirements with a PMD engineer.



Write today for new PMD reference catalog

PERMANENT MOLD DIE COMPANY, INC.

2273 EAST NINE MILE ROAD
HAZEL PARK, MICHIGAN
SLOCUM 7-8100 (Detroit)

SPECIALISTS IN AUTOMATED FOUNDRY EQUIPMENT AND LIGHT ALLOY TOOLING

For more information circle No. 53 on the Reader Service Card

ALNICO MAGNETS cover a wide variety of applications: for aircraft electric motors, compass needles, denture inserts, hearing aids, toy train magnets and many instrument applications. Finishing costs for them all are kept down by the Accumet precision investment casting process at Crucible.

accurate dimensions *of these Crucible investment castings* lower finishing costs

Because the castings in the picture are Alnico magnets, their finishing usually calls for costly grinding operations. That's because Alnico materials are hard and brittle. These castings, however, need virtually no finishing at all. The reason is to be found in the type of casting: Crucible Accumet® precision investment casting.

Crucible uses hot molds with special inner linings for producing Accumet precision investment castings which give two advantages: (1) they turn out castings to close tolerances, and (2) they produce surfaces that are exceptionally fine. These two advantages virtually eliminate all finishing operations. Crucible precision investment castings are available in a complete range of stainless, tool, and alloy steels, as well as Alnico permanent magnets.

For detailed information, write for booklet on "Crucible Accumet Investment Castings". Or you can find out exactly what type of castings you need by calling your Crucible representative.

Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

Canadian Distributor — Railway & Power Engineering Corp., Ltd.

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These parts are IMMUNE TO MOLTEN ALUMINUM

Molten aluminum can't wet, can't harm the precision-formed parts shown here. These parts and fittings for aluminum die-casting and direct-chill castings are all made of REFRAX® silicon-nitride-bonded silicon carbide. They are Carborundum's answer to the need for a material that can be formed into intricate parts with outstanding corrosion resistance far above normal melting temperatures. REFRAX shapes are solving many problems in aluminum holding furnaces and aluminum alloying furnaces (including reverberatory and induction).

Consider the value of these other properties in your operation: Tolerances of ± .0005 in./in.; a modulus of rupture of 5600 psi at 2450°F (even the best heat resistant alloy melts below this temperature); and high heat conductivity that approaches that of chrome-nickel steel. Write today for product bulletin and technical articles on REFRAX materials. ***Refractories Division, The Carborundum Company, Perth Amboy, New Jersey, Dept. W107.***

CARBORUNDUM
Registered Trade Mark

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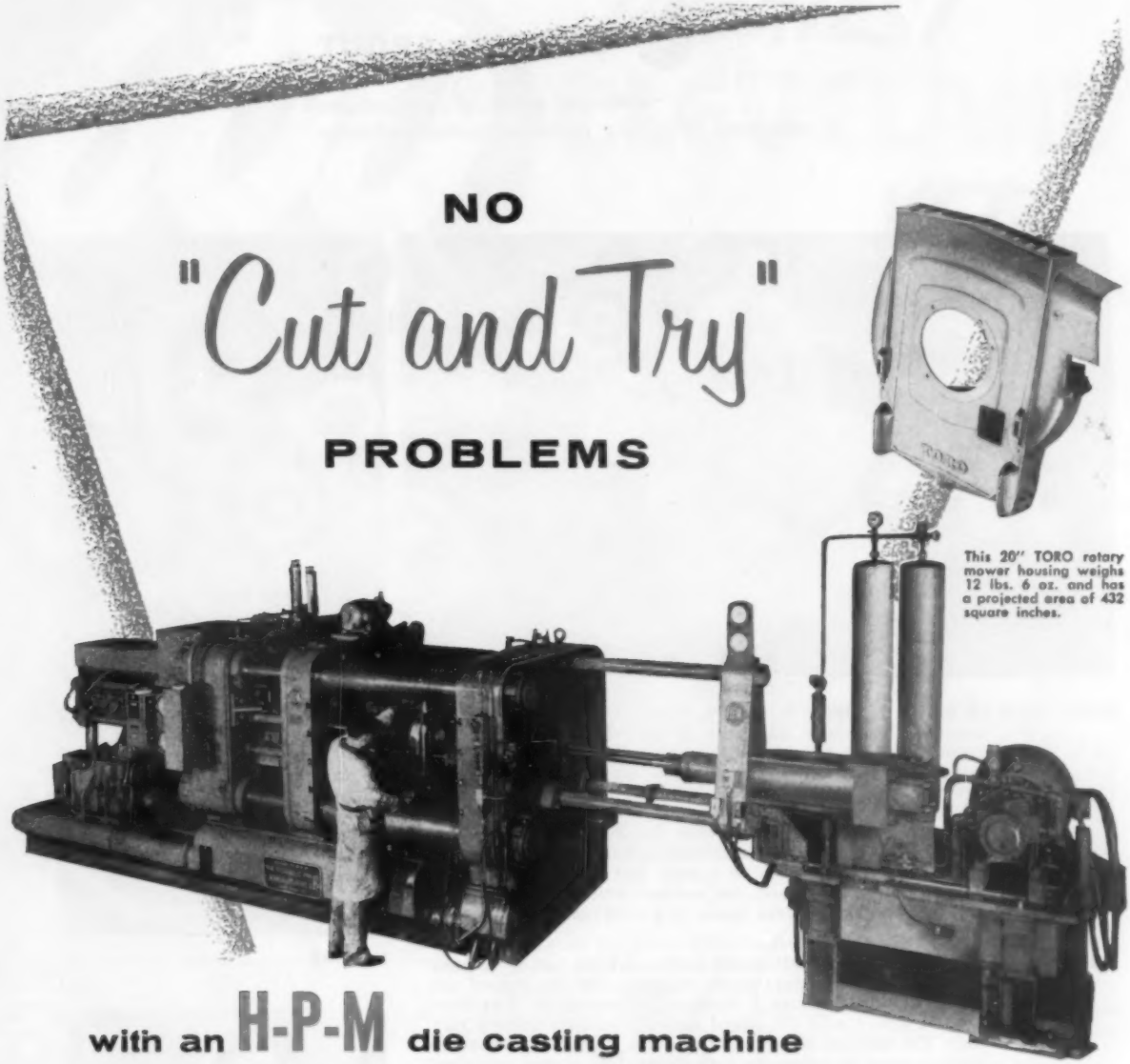
NO "Cut and Try" PROBLEMS



This 20" TORO rotary mower housing weighs 12 lbs. 6 oz. and has a projected area of 432 square inches.

with an H-P-M die casting machine

"Our new H-P-M 800-ton die casting machine is great. Three days after we had it installed with a new die we were running full production and getting top quality castings." This is the report from Char-Lynn Co., Minneapolis, Minnesota. The reasons . . . complete motion control and instantaneous follow-through of H-P-M's new injection end . . . high holding power of H-P-M's new link-wedge clamp. Results . . . practically no flash, and casting dimensional tolerances are held . . . castings are sound with high density . . . scrap loss is nil . . . intricate detail is accurately reproduced . . . surface finish is excellent . . . production is high. This is about all you could ask for in a die casting machine! Write for Bulletin 5700 or call in a nearby H-P-M engineer for the complete facts today.

HPM

THE HYDRAULIC PRESS MFG. CO.

Mount Gilead, Ohio, U.S.A.

A DIVISION OF KOEHRING COMPANY

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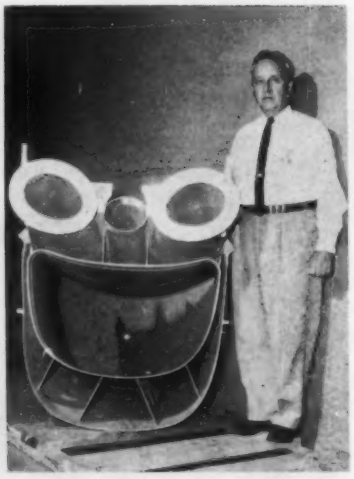
CASTING ABOUT

technical news of applications & processes involving precision metal moldings



MORE THAN 10 MILES IN THE AIR, Chance Vought Aircraft's Regulus II consumes enormous quantities of air to achieve supersonic speed. A 150-pound magnesium casting, the most complex ever purchased by Vought, is the air scoop to supply engine air and provide some of the needed cooling air. This casting, shown above in two views produced by R. H. Osbrink Mfg. Co. of Los Angeles, weighs slightly less than the Regulus I wing outer panel casting made by the same vendor, but is much more complex. The air scoop, made in a mold that stands six feet high and uses ten tons of sand, has nominal wall thickness of 0.24" and the solid leading edge tapers to a 0.015 cast radius.

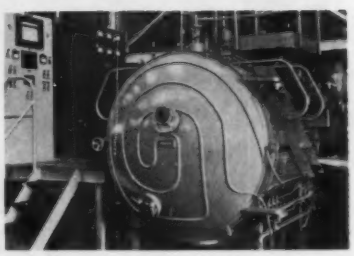
TITANIUM CASTING INVESTIGATION along with work on other reactive metals and new guided missile materials will be carried out by the General Thomas J. Rodman Laboratory of Watertown Arsenal with a new 500-pound capacity vacuum melting furnace. The furnace, built by F. J. Stokes Corp., is designed to produce metal of extremely high purity, free of slag inclusions and trapped and dissolved gases.

ABOUT 50 POUNDS OF ALUMINUM, including almost 25 pounds of die castings in its automatic transmission, go into the 1958 Edsel. Eight aluminum pistons weigh 1½ pounds each; end plates for starter assembly and power brake parts weigh six pounds.

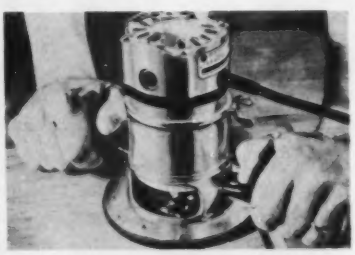
FUNCTIONAL FLAT-TOP is provided by die casting the end cap for Black & Decker's new 1 hp heavy-duty router. The level support made by changing the contours of the conventional motor and plates, permits the operator to place the router in inverted position, leaving both of the operator's hands free to adjust cutter depth.

HOW ZINC CONTROLS CORROSION, a 16 mm movie in sound and color, has been selected by the Library of Congress for its permanent archives. The film, produced by the American Zinc Institute, explains the mechanism of corrosion and shows how zinc coatings are applied to many steel products.

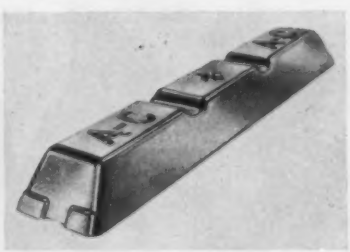
EASIER HANDLING AND STACKING are features of a redesigned aluminum ingot just announced by Alloys & Chemicals Manufacturing Co. of Cleveland. Change in the ingot shape was taken after a survey of handling problems encountered with ingots.



MELTING pure titanium in a vacuum.



FLAT, die cast top aids operator.



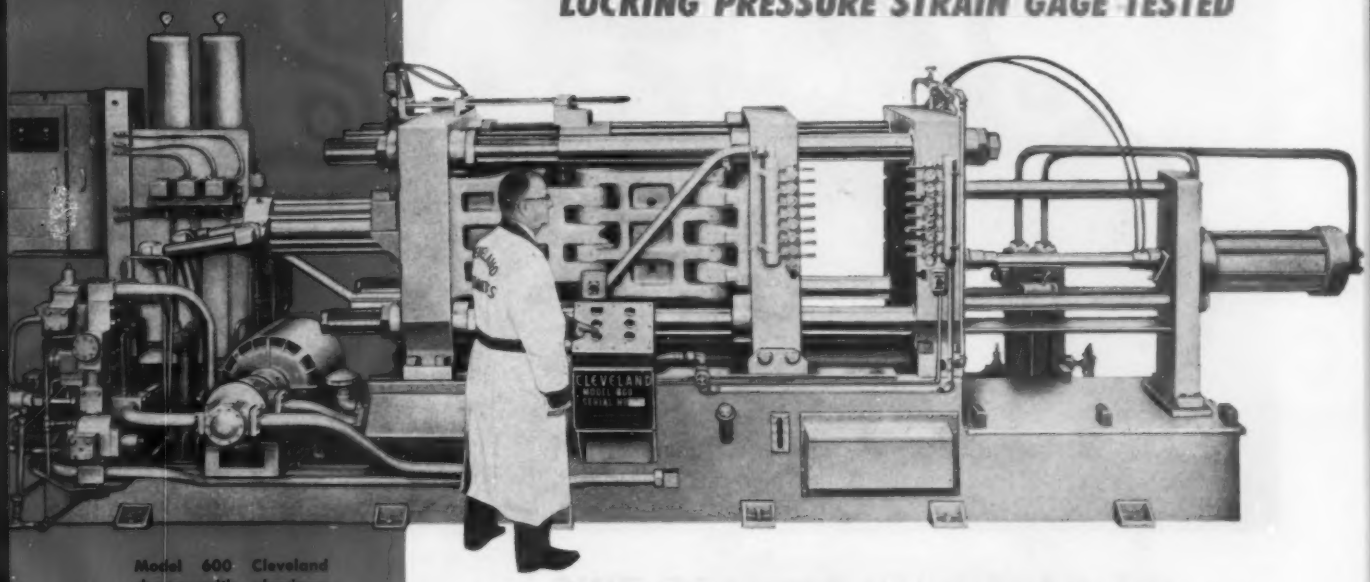
NEW INGOT shape stacks better.

MODEL 600

GREATEST CLEVELAND YET!

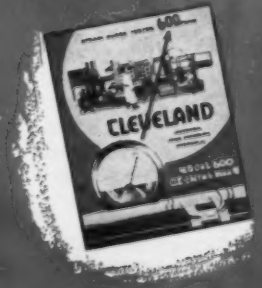
New 600-Ton Universal Hydraulic Die Casting Machine

LOCKING PRESSURE STRAIN GAGE TESTED



Model 600 Cleveland shown with aluminum shot end. Also available as a hot chamber machine. Has 46½" x 46" die plates; 28" x 28" space between tie bars; 30" max.—10" min. die thickness; 8" - 15" die opening.

Write for Bulletin 600



You're looking at the finest 600-ton die casting machine available today! The new Model 600 Cleveland was designed in every detail to give the die casting industry a machine of exceptional performance capabilities . . . high speed, reliable operation . . . safe and simple control . . . minimum maintenance. The developed machine more than met these specifications.

This new Cleveland will deliver castings weighing up to 10 lbs. aluminum, 25 lbs. zinc. An idea of the brawn built into the design—to back up its guaranteed 600-ton locking pressure—is indicated by the 38,000 lbs. net weight of the cold chamber machine shown above. Massive toggle system, 5" dia. tie bars and cross head guide bars, 7¾" thick platens, insure rigidity and accurate die alignment.

The hydraulic system is practically as leak-proof as can be built. Manifold valving is incorporated. Total pump capacity is 99 gpm. A 200 gal. oil reservoir is provided. Filter capacity is twice pump capacity. Two accumulators provide high injection speed.

Dozens of other highly important features—many are exclusively Cleveland's—are incorporated. You'll want to call in a Cleveland sales engineer for full details. In the meantime, factual information, well illustrated, in Bulletin 600 will give you plenty of incentive to reserve floor space for this new Cleveland in your shop. Write now for your copy.

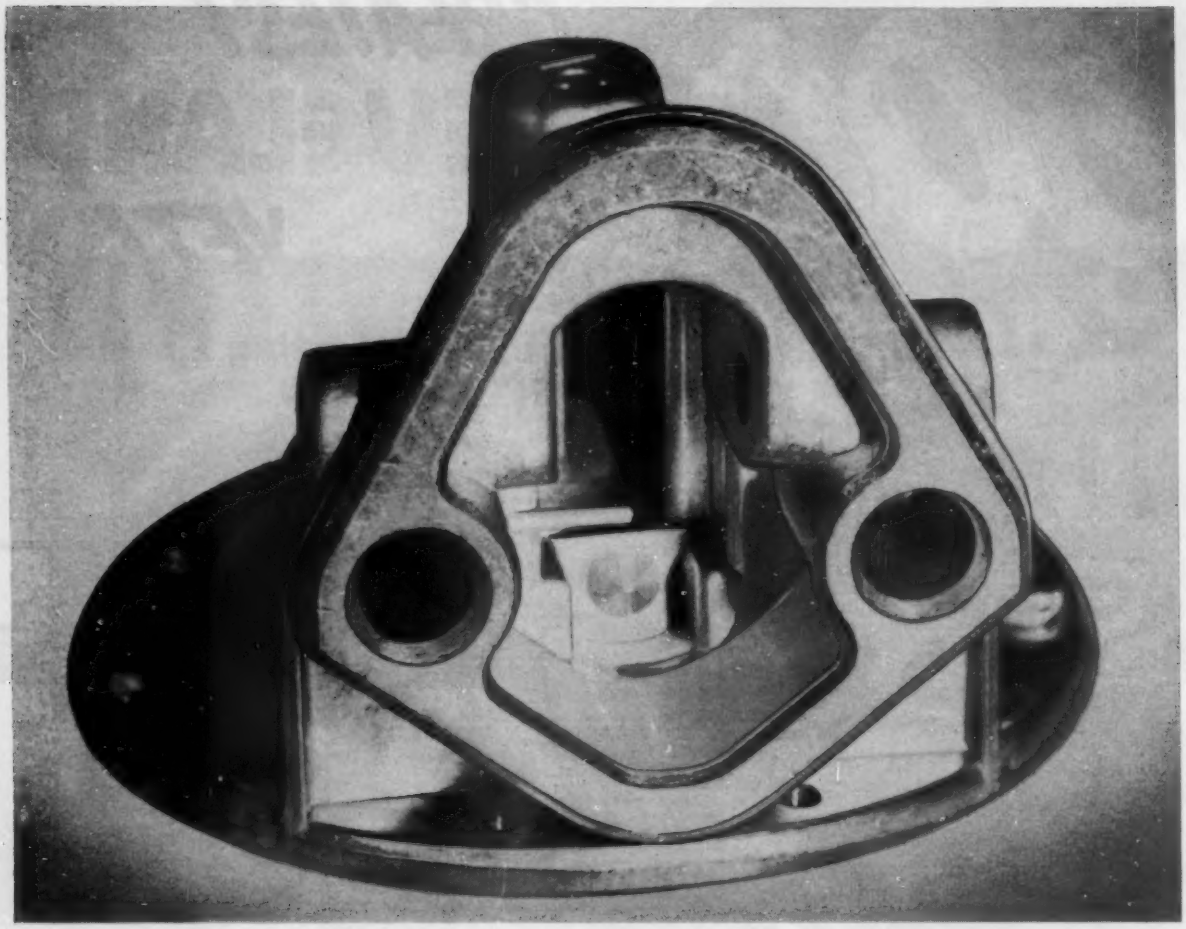
For more information circle No. 19 on the Reader Service Card

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4952 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • S. ORANGE

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines



DIE-CAST WITH TADANAC ZINC...

"but what is it?"

The die-casting industry of today is producing more and more complicated shapes, never before thought to be possible. Our illustration is typical of such shapes . . . using Tadanac Zinc of course, because it's ideal for low temperature high speed operation, and has the essential tensile strength and freedom from corrosion.

Tadanac Brand's consistent high purity, its guaranteed supply position backed by one of the world's largest zinc producers and a prompt delivery service, make it a preferred brand by die casters.

If you require any information or assistance regarding your Zinc die-casting operations, write to our Metal Sales Division, where your inquiries will be promptly attended to by our Technical Sales Service Department.

The photo shows part of an Automobile Fuel Pump Casing

COMINCO

THE CONSOLIDATED MINING AND SMELTING COMPANY OF CANADA LIMITED

METAL SALES DIVISION: 215 ST. JAMES ST., WEST, MONTREAL, QUEBEC, CANADA

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S7145-7

TADANAC ZINC SHAPES THE THINGS TO COME

For more information circle No. 23 on the Reader Service Card

PMM LETTERS

the readers' forum

MELTING FURNACES

Could you supply us with a source or sources for a Kirksite tilt type melting furnace or cupola of 1000 to 2500 lb. capacity, oil fired.—W. C. H. vice pres., mfg. and eng.

The names and addresses of several companies who can supply the type furnace WCH wants have been forwarded. — Ed.

ANODIZABLE ALLOY

In an issue of PMM some months ago you published data regarding a new patented aluminum die casting alloy, which as I recall was developed by a New England casting concern. This product's composition was such as to lend itself to anodizing and was of superior qualities to such alloys as 218.

Would it be possible for you to advise us regarding by whom such a product is manufactured? — A. P. M.

The alloy in question was developed by John A. Weber of the Webarm Die Casting Co. — Ed.

HOBBED DIES

I wish to know if you have literature concerned with the latest developments in hobbing operations for mold cavities as well as in cold extrusion of steel. Any information that you have will be highly appreciated. — J. A. (Mexico, D. F.)

Source of information has been sent. — Ed.

METAL FINISHING

I would like to obtain a reprint of an article which appeared in PRECISION METAL MOLDING for February 1957, on a pre-paint treatment for aluminum castings. I would also appreciate it if you could send me any additional information on this subject, including the name of the company where the process was developed. M. V. V.

Tear sheets and the other information desired have been sent. — Ed.

Readers are invited to write the editor of Precision Metal Molding Magazine. We will try to answer your questions or refer you to reliable sources. Editor.

WANT TO
CUT COSTS
ON YOUR
DIE CASTINGS?

LOOK INTO THIS "New" MODEL 150Z AMERICAN DIE CASTING MACHINE

FOR ZINC — TIN — LEAD

- BIGGER—4 lb. shot capacity. 150 ton locking pressure.
- BETTER—20" x 21" platens—solid steel toggles.
- LOWER COST—Much lower than machines of comparable performance.
- FASTER—Up to 700 shots per hour.
- LOWER OPERATING COST—Only 20¢ per hour for gas and electricity.
- EASY TO BUY—Financing up to 36 months.

COMPLETE — SHIPPED READY TO OPERATE — NO EXTRAS TO BUY.

Model 150A
available for Aluminum, Brass, Magnesium.

Look into the cost cutting possibilities of this new machine — premium quality castings produced at lower cost than ever before.

We will help install your American Die Casting Machine and train one of your men as an operator.

Write — wire for catalog and price.

AMERICAN DIE CASTING MACHINERY CO.

1748 W. Winona Avenue • Chicago 40, Illinois

For more information circle No. 10 on the Reader Service Card

WANT TO MELT A MOUNTAIN OF METAL?

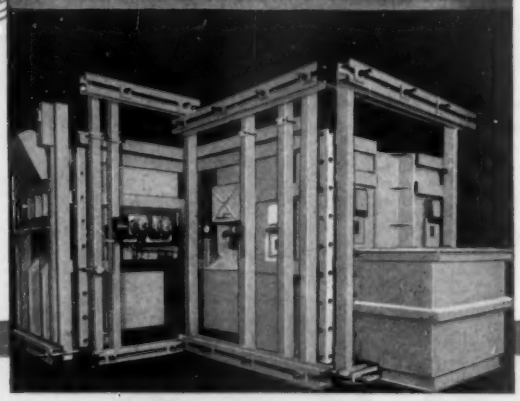
THESE BIG STROMANS WILL DO IT...BUT FAST!

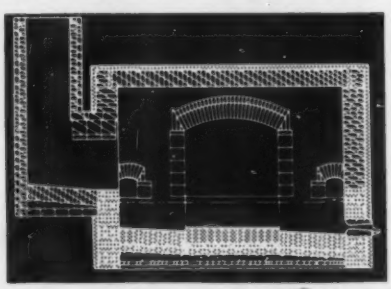
STROMAN LARGE SIZE REVERBERATORY FURNACES

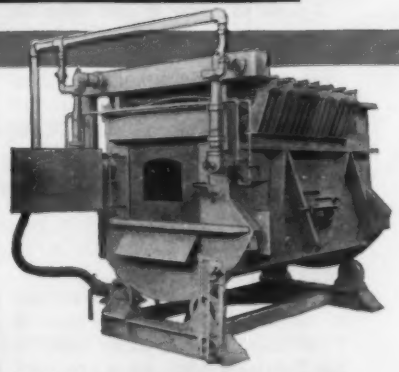
For Melting Unlimited Capacities of Aluminum, Zinc or Brass

These reverbs are built to assure heavy duty production for Smelting, Extrusion work, Die Casting, Permanent Molding and Foundry melting. Now in operation in some of the most prominent plants in the country, they have proved their ability to deliver large tonnages of metal, are easy to work with and are fast . . . operate most economically and are easy to maintain. Their efficiency and economy will amaze you and convince you of their superiority.

Furnaces of this type are designed to meet customers' individual requirements . . . let our engineers show you how to achieve utmost efficiency and economy in your melting operations.







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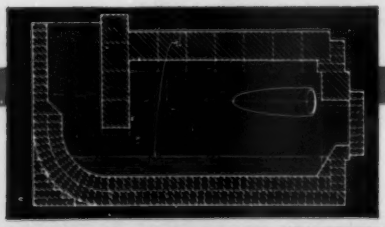

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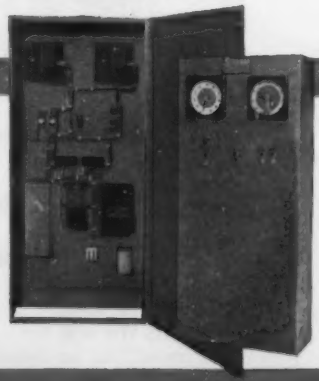

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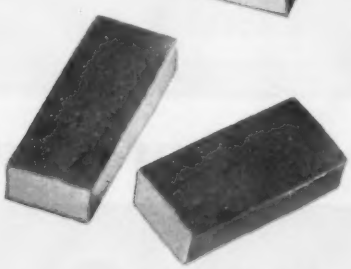

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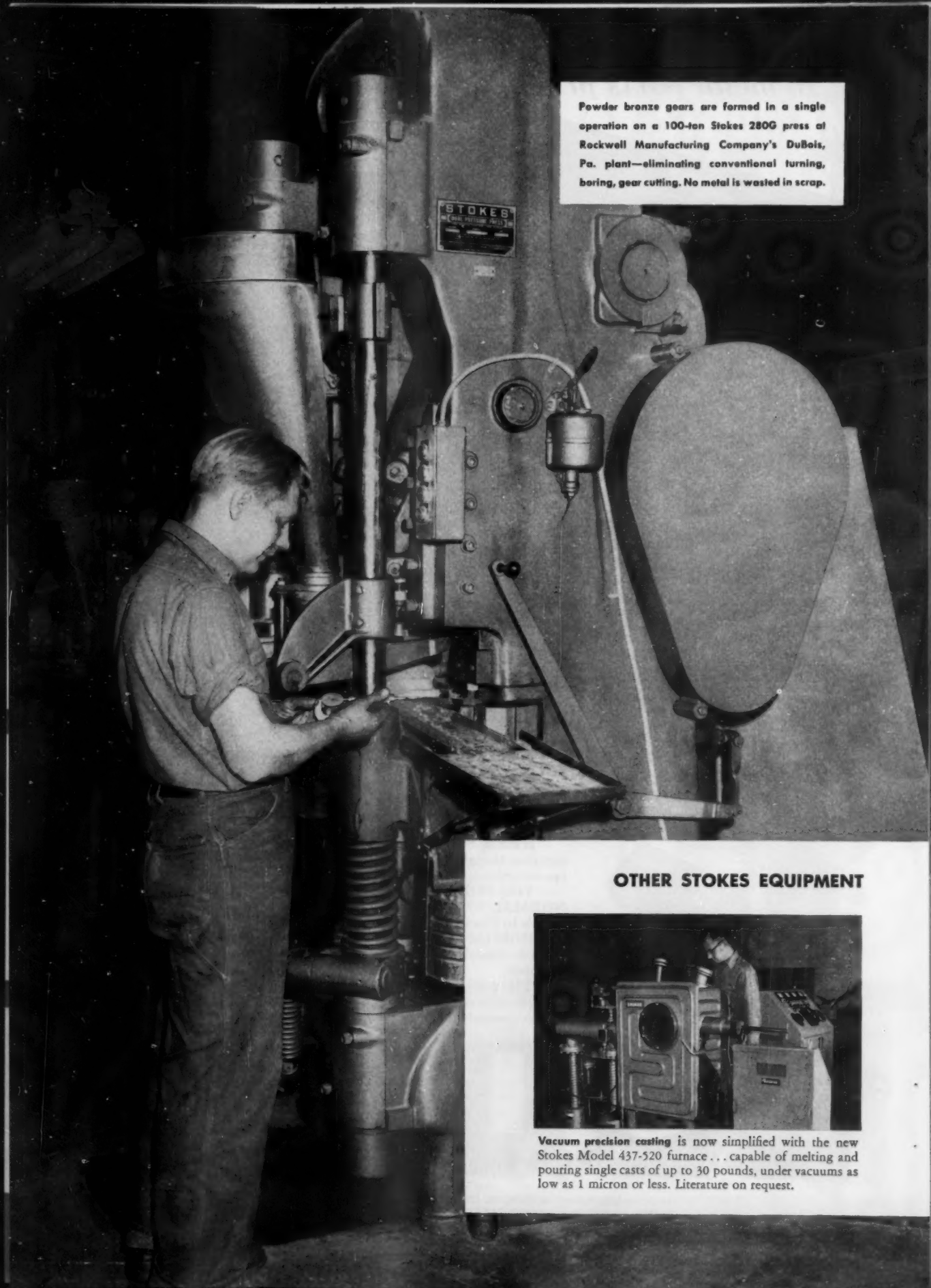

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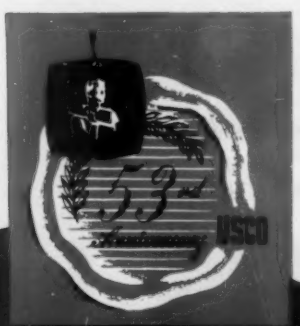

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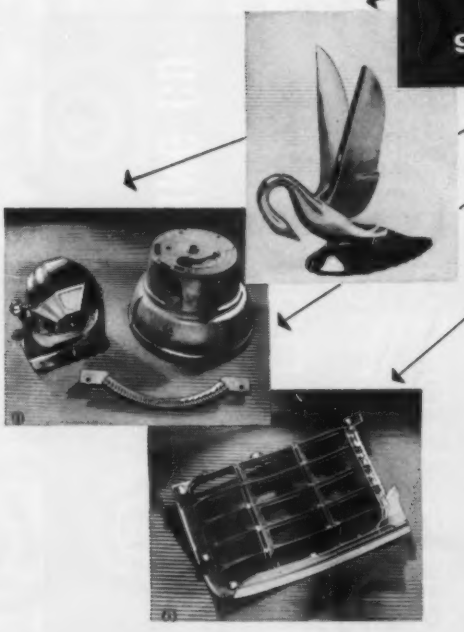

YOU CAN'T GO WRONG on any of these three counts:

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The American Zinc Institute, 60 East 42nd Street, New York 17, New York, has available a very interesting 28-page brochure, "Die-Casting-Molten Metal to Finished Part—Direct." We suggest that you send for it. It contains helpful technical information.

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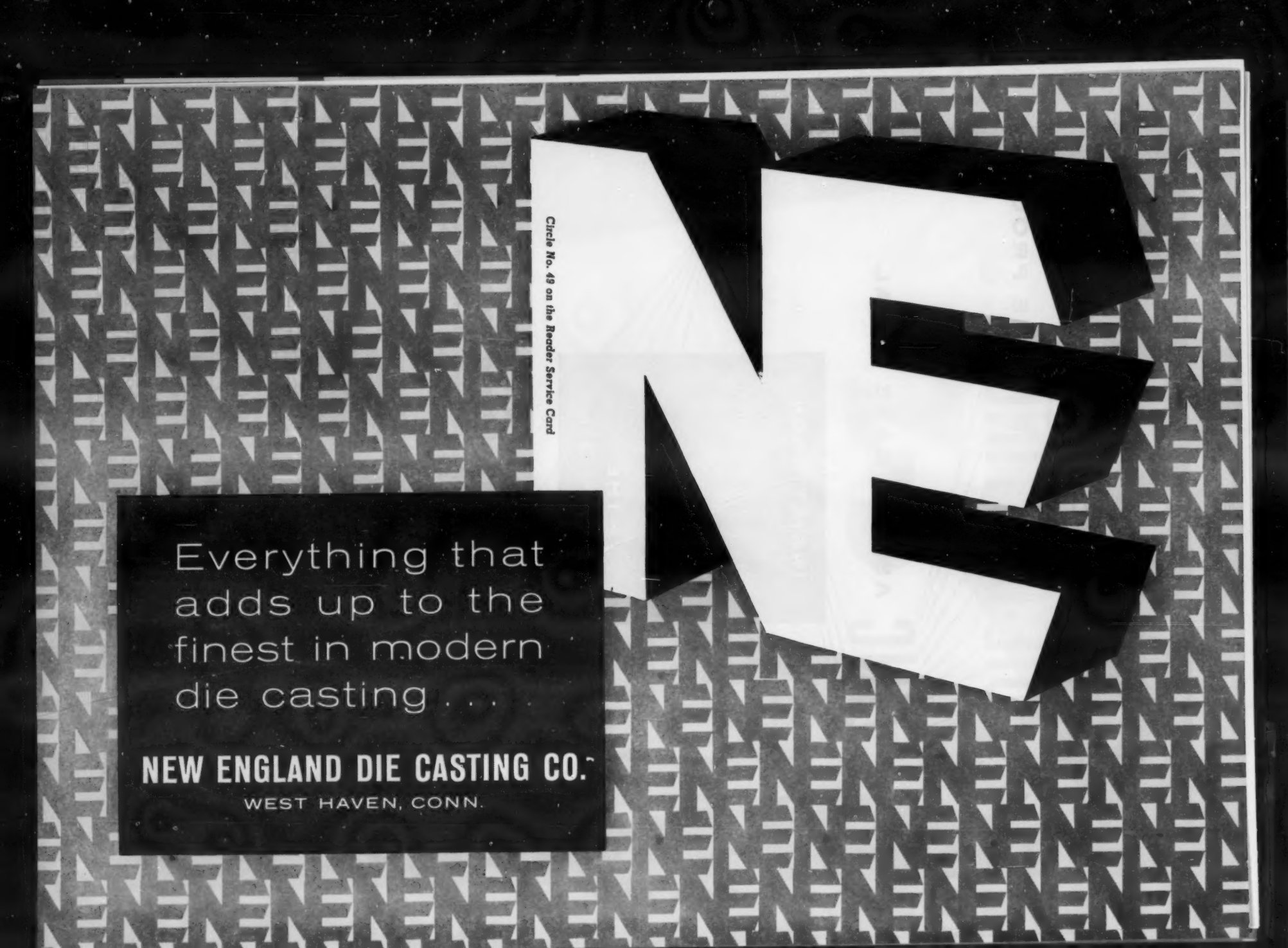
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European Die Castings

THE consumption of zinc alloys has steadily risen in recent years in almost all West European countries. Last year 73,500 tons of zinc alloys were used for pressure die casting in Great Britain, France, Germany and Italy alone. This represented an increase of about 22 percent over consumption in 1954. While most of this tonnage went into the automobile field, other branches of the manufacturing industries have contributed to this increase in the use of zinc alloy die castings.

The field of use is so wide, that examples given on the following pages have been limited to gears, small tools, textile machinery, sewing machines, vending machines and scales.

The components illustrated have been provided by die casters in Germany, France, Great Britain, Italy, Sweden and Switzerland.

A higher than usual degree of precision is required for component parts in textile and sewing machines as well as for vending machines and scales. Zinc alloys are preferred for these uses since, as die castings, they have greater precision than the light metals or brass.

Of the two standard high purity zinc alloys, B.S. 1004 A is generally preferred for light engineering applications because of its superior dimensional stability, and also for its resistance to tropical atmospheres. It is, however, esseential that the impurity limits laid down in the standard should not be exceeded and that the alloy composition should be carefully controlled.

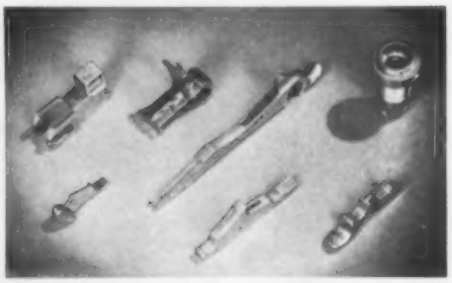
Still another large consumer of zinc die castings in Europe is the toy industry. While tonnage figures for zinc alloy consumption by this industry are not presently available, it is an impressive fraction of the whole.

Again, figures for the latest year consumption of zinc alloy by the automobile industry are not available, but in 1953 over 30,000 tons were used.

In later issues of PMM, both the toy and automobile industries useage of zinc die castings will be reviewed. The editors wish to express their appreciation to the Zinc Development Association, London, for illustrations and text material used here.

TEXTILE MACHINES

GERMANY — Spindle bracket for a textile machine. Permissible tolerance .004. Machining, reaming of hole only.



GREAT BRITAIN — Parts for a cone winding machine. The small holes and numbers are cast on.

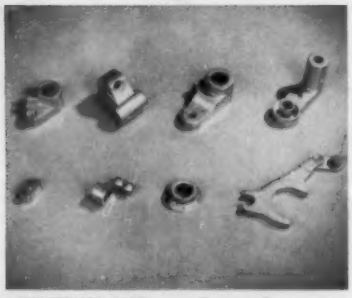
SWITZERLAND — Zinc die castings that have replaced fully machined cast iron parts. Little or no machining is now needed.

SEWING MACHINES

GERMANY — Motor housing members cast with sufficient accuracy so that practically no machining is needed. Cast fit is adequate for assembly of the three sections.

GERMANY — The stitch adjustment lever (upper left) is reported to be cast with hole diameters held to 0.0004 tolerances.

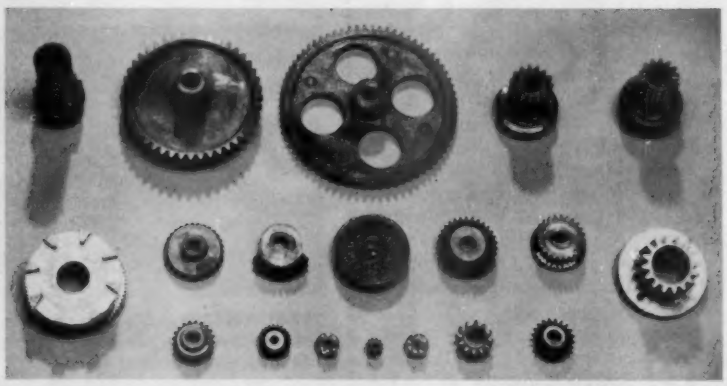
GERMANY — Housings and covers, especially for fancy stitch machines are cast ready for assembly. Control levers and knobs are also fully finished.



GERMANY — Small, intricate parts held to close dimensional tolerances; many with raised numbers are cast complete except for tapping.

SWITZERLAND — Largely cover plates and housings. Note ribbing on the relatively large cover that must be held absolutely flat.

GEARS



SWEDEN — A variety of gears and pinions, accurately cast and ready for use as trimmed.

SWEDEN — So-called toothed discs and a bevel gear used for light power transmission.

BECAUSE gears and pinions can be very accurately die cast in a single operation, and generally require no machining after trimming other than to drill and tap set-screw holes and sometimes ream the bore, they represent one of the more fruitful sources of cost reduction.

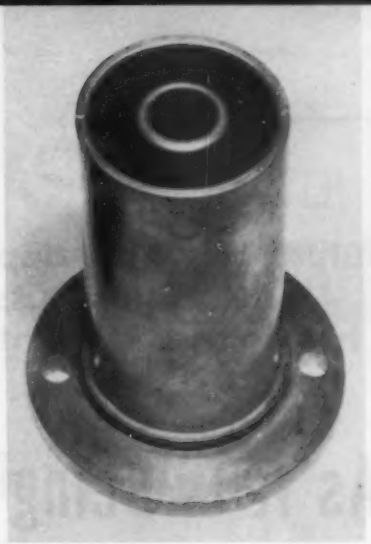
In many of the applications illustrated here, extreme accuracy of duplication from piece to piece is of utmost importance. The accuracy is most readily achieved through the use of die castings.

Where rotational speeds are low and loading light, zinc die cast gears can often be operated with little or no lubrication, a distinct advantage in some locations on textile and similar equipment.

Drive housings are also zinc die castings whenever possible because of the simplicity of casting oil and grease tight joints and the accuracy with which cored holes can be cast so that little or no machining, other than line reaming, is required.

GRAY iron, malleable cast iron and sheet steel were formerly the usual materials for the construction of all types of weighing machines. Here again, it was recognized that zinc die castings offered special advantages and was the most economical method of manufacture when a reasonably large number of duplicate pieces were required. Thin walled die cast bases have largely replaced drawn sheet steel because of their greater rigidity, simpler assembly possibilities and over-all lower costs.

Frame members, other than bases, are also widely produced as die castings since they allow the production of a better contoured, more rigid part; again at reduced cost.



SWITZERLAND — A cylinder for an automatic scale. The zinc die casting replaces a gray iron casting.

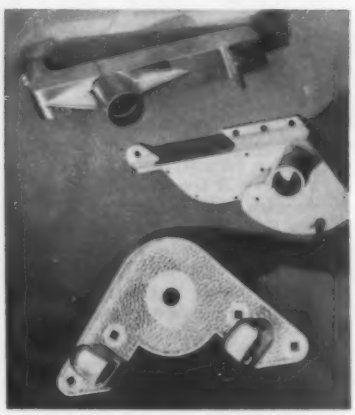
WEIGHING MACHINES

SWITZERLAND — Beam and weights, with cast in iron inserts, for a scale. Positioning of the inserts of critical.

AUTOMATIC MACHINES

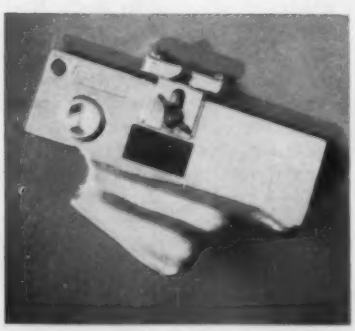
GERMANY — External part for a vending machine. The good decorative effect achieved as well as the method of casting support and mounting members is shown.

GERMANY — Housing members for the automatic coin testing equipment. Both these parts and many of the internal working parts are zinc die castings.



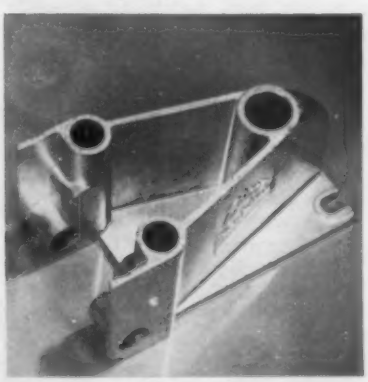
GERMANY — Bearing holes, bolt holes, pins and pin holes are all cast in so that machining after casting and trimming is reduced to a minimum.

SMALL TOOLS



GREAT BRITAIN — A carton opener, entirely die cast except for the cutting blade, the machine screw and wing nut.

GREAT BRITAIN — Tailstock for a small lathe. Here the die casting must withstand vibration and reasonably high stresses.



ZINC alloy die castings are widely used for tools, such as screwdriver handles, drills, knife sharpeners and tape measure casings, as well as for parts of power tools and cutting tools of all kinds.

The increasing use of die castings in this field has been due mainly to low costs, since small tools are produced in long runs.

Some of the most common uses, other than such items as handles, are base plates, brackets and housings which carry numerous other parts or are composed of several parts. Die casting enables the casting to fit exactly and the various fastening devices to be cast-in.

"The future no longer depends on sandcasting" says this Russian foundry engineer as he discusse the interesting future of . . .

Die Casting As It Is Being Applied And Developed in the Soviet Union

Editor's note— At the Second International Die Casting Conference recently held in Paris, a short talk was given by A. S. Ievsseiv, chief engineer, Foundry Section of the Institute of Research for the Automobile Industry, Moscow, U.S.S.R. The following is a translation of Mr. Ievsseiv's address.

IT is difficult to over-estimate the importance of pressure die casting in the modern engineering industry. It seems to me that today each die caster, whether engaged in making large or small products, must realize that the future depends no longer on sand casting, but on pressure casting in permanent dies. I will limit myself to outlining the problems which have already been solved or which now concern the Russian engineer.

It is difficult today to imagine any mechanical engineering works in the U.S.S.R., however small, which does not possess its own die casting shop. Numerous specialized institutes are concerned with technological problems and carry out research in the field of pressure die casting and the construction of tools and equipment for this process.

Zinc and aluminum alloys are of first importance, the maximum about 12 to 13 kilograms (26 to 29 lbs.), with a surface area of 1 square meter. At present we are studying the design of machines and dies to pressure cast cylinder blocks for cars. One of our main objects is to evolve a more automatic mechanism which begins by melting the alloy and completes the operation by finishing the casting.

After zinc and aluminum come the copper-base alloys such as bronze, brass, etc. Here, as is well known, the main difficulty lies in the wear of the die, and whereas for zinc alloys the hardness of the die makes 300,000 shots possible and for aluminum 80,000 shots for brass it rarely exceeds 40,000 shots. We are seeking to solve this problem in two different ways.

The first consists of looking for new materials for the die and new lubricants as well as thermal balance suitable for the die and the alloy to be cast. The most frequently used die material is steel termed 3 Cr V8 (customary Russian classification) containing O.3-O.4%C; O.2-O.4% Mn; 2.2-2.5% Cr; 7.5-9%W; and O.2-O.5%V.

The second way consists of trying to simplify the methods of die making so enabling a cheap standard quality steel to be used which allows a short die life to be tolerated. Dies are made by the "lost wax" process, by cold or hot pressing, and by pressure casting of steel blocks against water-cooled aluminum models: these aluminum models are themselves produced in a steel die and several copies are pressure cast, which will then permit the manufacture of numerous dies at low cost. Another method consists of casting the steel blocks against master models of copper which are also water-cooled.

Research is likewise being carried out into the possibility of making dies by powder metallurgy. To ensure pre-eminence of pressure die casting as a process, the problem of casting in four kinds of alloy must be solved. When this has been done pressure die casting will be able to challenge the opposition of all other methods of precision steel casting, including gravity die casting, lost wax, etc. Great importance is attached to this problem. A machine for pressure casting ferrous alloys had already been described in Russian journals in 1933-35. This machine worked satisfactorily but its use did not become general, owing to die wear which was very rapid at the time. At present we are attempting to perfect this process.

INVESTMENT CASTINGS

COVER STORY

When they are larger, stronger and cheaper there will be more . . .

Steel Castings In Air Frames

by S. K. Hodgson*

S. K. Hodgson

Editor's Note: This article is a condensation of a paper presented at the fifth annual meeting of the Investment Casting Institute, Washington, D. C., May, 1957. The complete paper is available in the Institute Proceedings.

CHANCE Vought Aircraft of Dallas, Texas has produced airplanes for the U. S. Navy since 1919. Present production consists of the F8U-1 Crusader, a carrier based fighter, winner of the Thompson Trophy at 1015 miles per hour. Regulus I; the only air breathing U. S. Navy missile in operational status and Regulus II a supersonic missile similar in design to Regulus I.

Company policy is to utilize new materials and processes as soon as possible and practical. Such was the case in 1941 when the B. F. Hirsch Company of New York sold Chance Vought the first steel investment casting. It was a small 4230 hook used on the F4U-1 Corsair, at least 25,000 of them were used.

Jet engines made necessary many changes in cast parts, especially in the F8U-1 Crusader and the Regulus II models. The change was to much more highly loaded parts in very restricted spaces and operating at elevated temperatures. A good example of this is the family of eight investment steel hinge castings that hold the leading edge droop on the F8U-1 Crusader wing. When first produced two years ago, these hinge castings were dimensionally large for the investment casting process. They are 410 stainless steel, 0.12 thick, about 8" long and heat treated to 180,000 psi min. TS. There is also an experimental type incorporating an operational horn. This latter casting was considered for production two years ago, but use seemed unwise as it would be almost impossible to hogout this composite fitting from steel bars in case casting delivery

*Staff Engineer
Chance Vought Aircraft, Dallas, Texas

HODGSON'S AUDIENCE listens as he presents his important paper dealing with the use of investment castings on aircraft. Only a portion of those attending the I.C.I. meeting can be seen in this photo.

EXHIBITS at the I.C.I. meeting were seen by many engineers and technicians from all over the United States. Seen above are some of the excellent displays being examined by members and visitors.

OTHER LISTENERS giving the speaker their full attention as he discusses the future of investment castings in airframes.

was delayed. This decision was correct because 50 sets, or 400 fittings, of the simple type were hogged-out before we had enough castings for production. It took 9000 pounds of steel bars to make these 400 fittings which weighed 500 pounds finished. Steel forgings would have helped some but in order to keep the 0.12 thickness and the ±0.01 tolerance would have required all over machining.

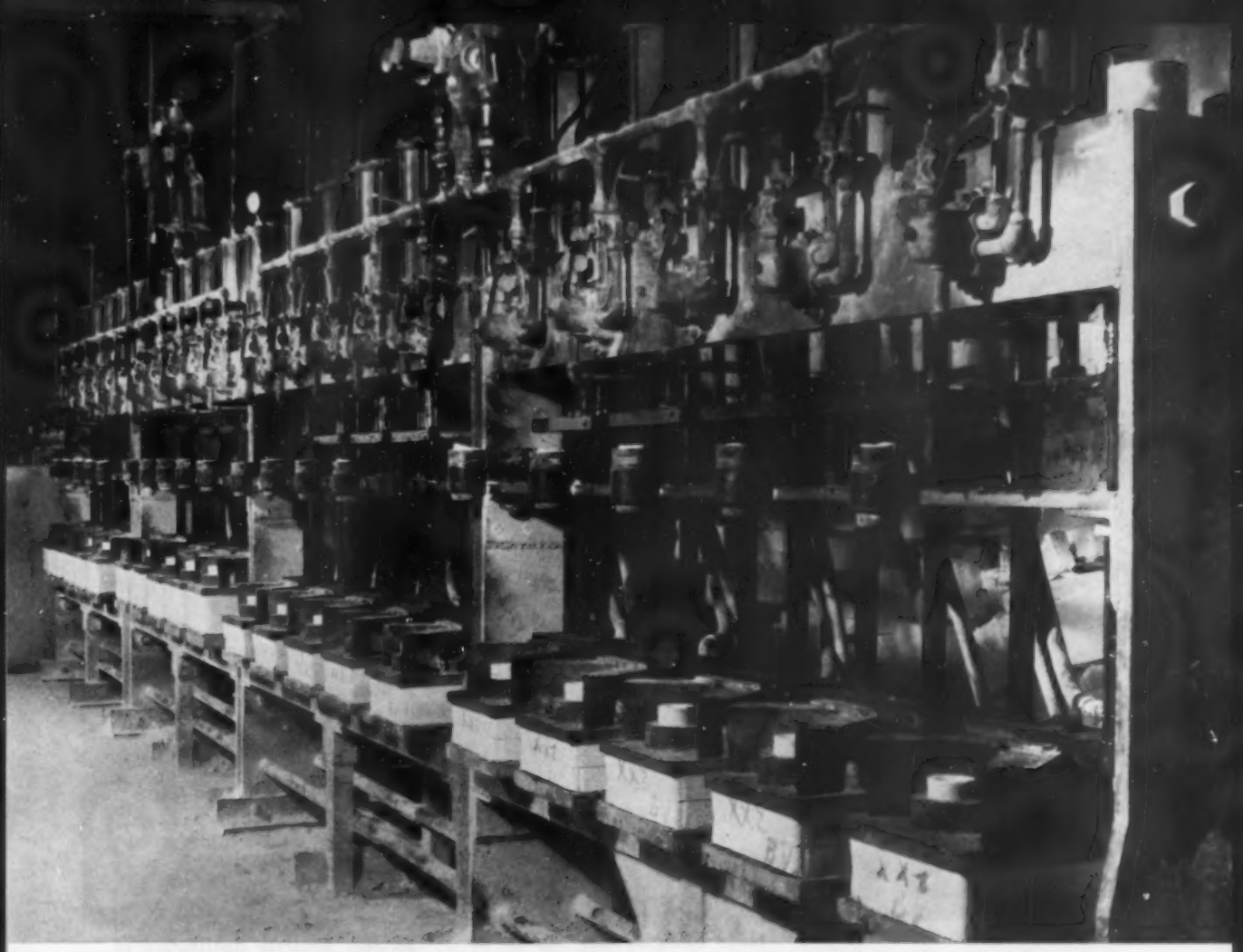
About 40 percent of the castings used are produced by the investment casting process.

Up to now most of the castings are 410 stainless steel at 180,000 psi min. TS but some difficulty in heat treatment has been experienced and the shop has complained of hard spots during machining. Recently several parts were released at 4140 steel castings but there is sure to be a problem of decarburization or one of carbon restoration. 17-4PH stainless steel or 431 stainless steel are useful materials as operating temperatures increase. Present applications call for fittings in the region of the engine and afterburner to operate at 900° F. Halcomb 218 tool steel has been tried for such applications.

Chance Vought Aircraft is a recognized leader in applications of aluminum and magnesium sand castings in airframe design. This holds true also for steel investment castings. Serious attempts have been made during the last two years to reduce aircraft costs by using steel castings. There has been definite progress. Existing specifications did not truely reflect the tremendous advance made by the investment casting industry since World War II. In order to fully utilize the products, new specifications were issued.

Experience with castings has shown there must be a continuous liaison with the casting vendors in order to operate a successful casting program.

Wherever possible, policy in the future will be to buy investment castings machined by the casting vendors, this is basically sound. Any difficulty with a casting will be discovered sooner and can be corrected immediately by the vendor and should result in fewer casting rejections.



VACUUM LINE of plaster molds waiting for pouring. These plaster molds are lined up as seen in the above photograph, waiting to receive their individual pourings of molten metal. Exhaust systems are ready to empty the molds of air and gases, permitting the penetration of the entire cavity, making dense, sound castings.

PLASTER MOLD CASTINGS

Vacuum As An Aid To Better Castings

By Edward S. Czoraiak*

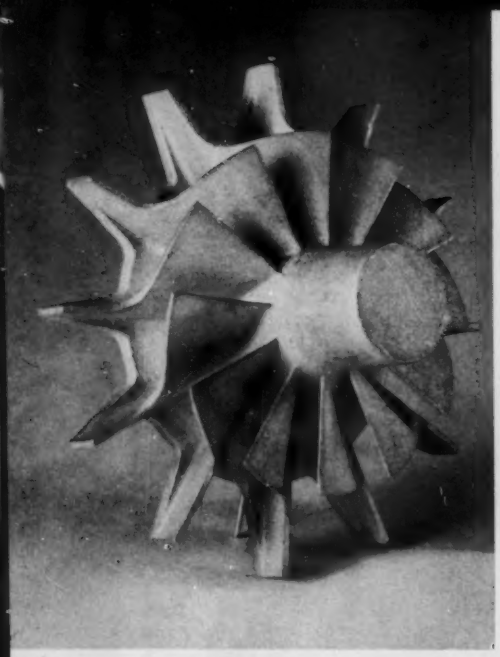
VACUUM casting is not new to industry and often can mean anything, from vacuum melting to vacuum degassing. Universal Casting Corp., however, applies a vacuum to the mold cavity, to produce close-grained, high-density castings free of porosity and inclusions. Unusual physical properties are attained without the sacrifice of intricate detail and close dimensional tolerances.

Through the use of reduced pressures in the mold cavity it is possible to pour many metals at a much lower than normal temperature. At the low temperature the metal is quite viscous and solidifies rapidly, resulting in castings of improved mechanical and physical properties. By applying vacuum to both the cope and drag sections of a highly permeable plaster mold, the metal is "sucked" into place so that intricate detail of the molds is faithfully reproduced. Since gas and vapor flow is away from the metal and into the vacuum system, there is less danger of porosity due to entrapped gases.

High production methods generally enable the foundry to make the high quality castings at costs equal to sand castings and lower than investment methods.

Patterns are made of highly-polished engraver's brass and mounted on plates. A unique "Unit Strip Plan" has been adopted for the placement of the patterns into the mold halves. The flasks are sub-divided into one-inch increments for the entire 18" of flask length. The 10" width is divided in half by the runner going down the center to the sprue. This system enables the custom-

*Sales Manager
UNIVERSAL CASTINGS CORPORATION



IMPELLER BLADE was cast .05" thick and tapered into a .01" radius on the leading edge.

er to utilize a small or large space in the flask depending on his production requirements. For short runs or prototype work, a pattern placed in the flask in this way may share space with several other patterns of different sizes and shapes, to be poured in the same alloy. This permits the sharing of initial mold costs with others, making economical, short runs of parts. To increase production of castings, low cost duplication of patterns can be accomplished to as great an extent as is required. Should design changes be required they can be accommodated easily due to the nature of tooling involved. The initial outlay for patterns in the "Vacuum Cast Process" is the total cost. Replacement of finalized patterns is never necessary.

The Unit Strip Plan allows customers to prove their parts experimentally using only one pattern. After the job has proven itself any necessary changes can then be made to the remaining patterns required for the volume production run.

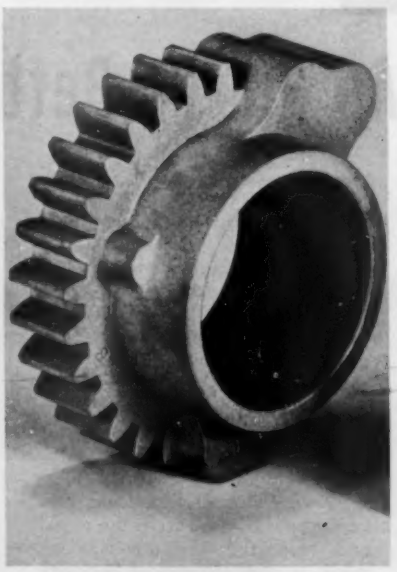
Plaster molds made from the patterns are composed of a mixture of ordinary industrial plaster, talc, and water. This material is mixed hot to a slurry comparable to a heavy cream. The hot, plastic, talc mixture is gravity poured over the highly polished patterns. Upon solidification the finest engraving and most intricate shapes are accurately reproduced in the plaster. Setting of the mixture occurs within a very short time after pouring. When the mold has set sufficiently to support its own weight it is removed from the flask. The cope and drag halves are then put into continuous automatically controlled ovens for baking. All free water and water of crystallization is driven off so that no moisture remains. The molds have now become permeable so that "Vacuum Casting" can be utilized.

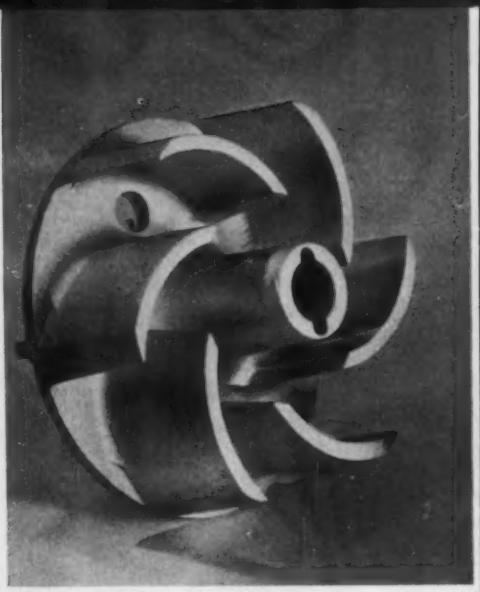
Cores are made of the same materials so that the same smooth glossy surfaces can be secured in the cores that exists in the internal cavities of both cope and drag sections.

Castings poured into these dehydrated plaster cope and drag sections with cores in place cannot become scratched or nicked when broken out of the plaster. Any plaster that may adhere to the casting may then be washed away with a high pressure jet of water. The "as cast" surfaces produced are in the 45 to 80 microinch RMS finish range. Distortion and warpage of castings is negligible with this process.

An adaptation of plaster cast surfaces coupled with vacuum casting methods has been applied to torque converters and impeller work. Complex and intricate blade configurations can be accurately reproduced in both shrouded or open type impellers

GEAR SECTOR of mangenese bronze. Circular pitch is .2618, tooth thickness is .1309.





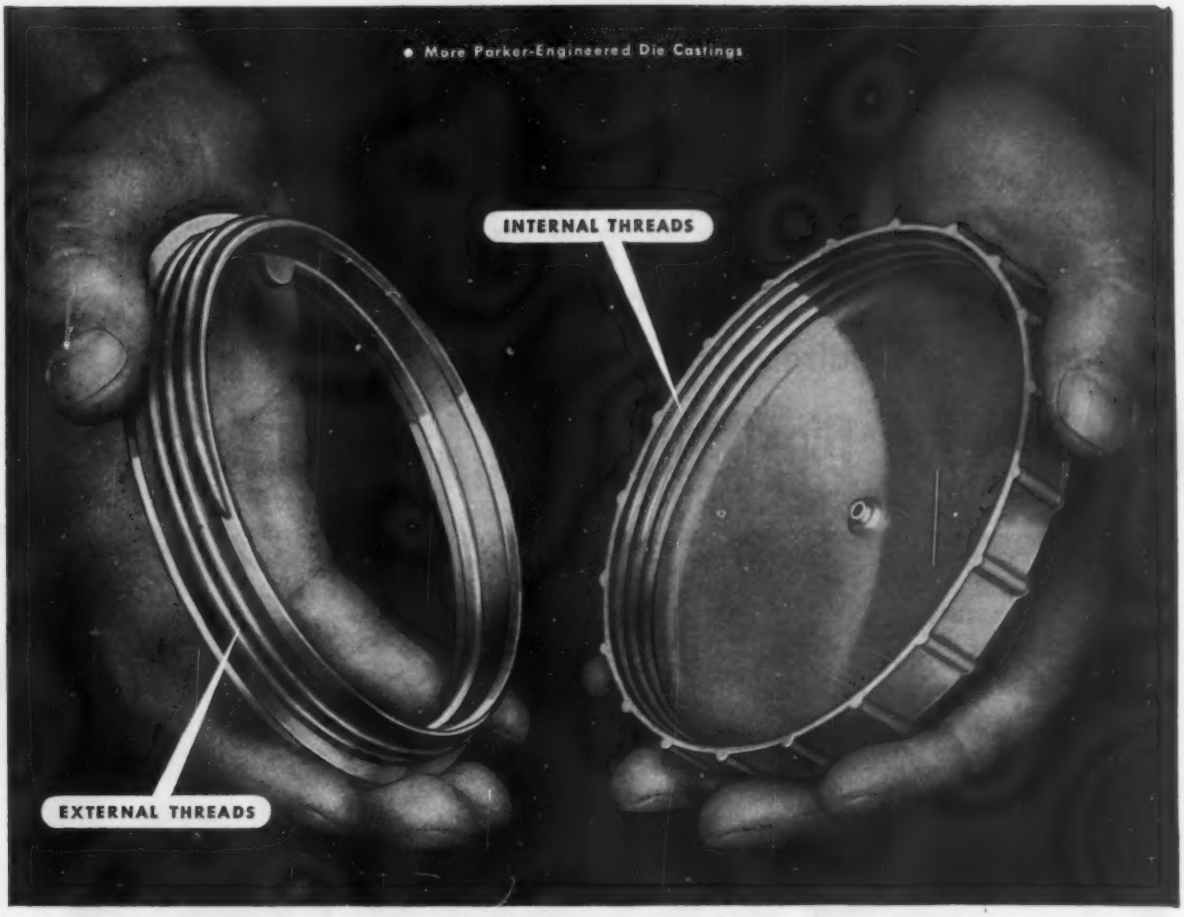
BRASS impeller has 23/64" diameter hole through hub. Blades are 3/32" thick, have .01" taper.

and torque convertors. The method employed permits the use of solid cores to produce, within close dimensional tolerances; blade spacing, blade configuration and absolute angularity. Through this method no misalignment of spacing or racking of core sections can occur. The smooth glossy surfaces produced in this type of casting eliminates the use of costly internal polishing or machining. Expensive balancing of these wheels is minimized through accurate distribution of weight made possible through uniform thickness in the blades themselves. Blade sections can be cast to a knife edge with shrouds as thin as 1/32 of an inch or with no shroud at all. Among the applications of this process are high speed impellers, diffusers, pumps, torque convertors and many others that could only be made prior to this development as a group of very costly fabrications.

A wide variety of alloys are available for casting in plaster through the vacuum cast process. All are copper base alloys with the exception of No. 356 aluminum. One of the alloys lowest in cost and most extensively used is No. 10 yellow brass. It compares in specification to most of the commonly used brasses. Good physical strength can be achieved with this alloy and its toughness is rated above average. Its machinability characteristics are good. Uses for this specific alloy are many and varied.

One of the highest strength ma-

Continued on page 65



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These two mating parts, including the threads, are cast simultaneously in the same die. The result—three savings:

1—One die instead of two *saves die cost*

2—Casting two parts at one time in the same die *saves production time*

3—Precision casting of the perfectly mated threads with no parting line *saves machining cost*

Together, these three savings result in a substantially lower cost per piece. Just another example of the way Parker-engineered die castings save you money.

Parker has been a leader in die casting for over 50 years—an old hand with new ideas. This skill and experience can solve problems — and save money—on *your* component parts. Just call the nearest Parker sales engineer or write the factory direct.

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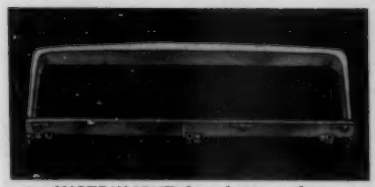
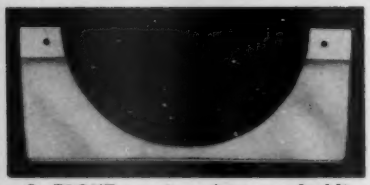


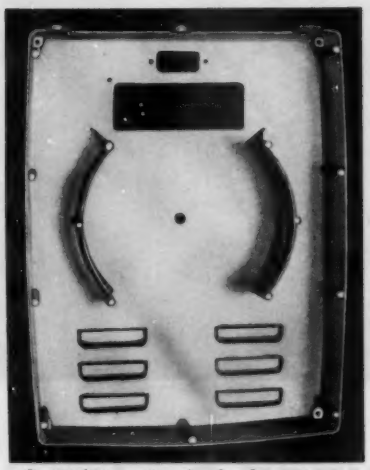
1. **INSTRUMENT** bezel is a chromium plated zinc casting.



2. **FRONT** casting (upper half) needs minimum machining.

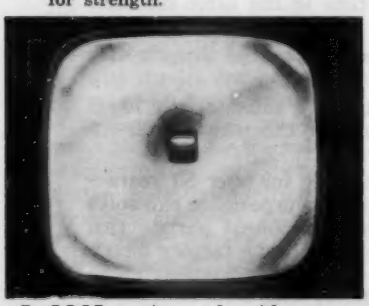
Skillful applications of design and materials resulted in a . . .

New Use For Die Castings In A Sterilizer



3. **BACK** casting is the largest one used on this sterilizer.

4. **LOCKING BAR** must be ribbed for strength.



5. **DOOR** casting seals with a gasket in a cast-in groove.

6. **FRONT** casting (lower half) matches casting in fig. 2.

WHERE-EVER the danger of bacterial contamination is possible, die castings reveal one of their more important characteristics; the ability to cast smoothly, contoured, nonporous surfaces. They blend into associated parts with an almost complete absence of sharp corners making maintenance of sterile conditions easy.

There are other, equally compelling reasons for using as many die cast parts as possible in the sterilizer shown on the right. Eye-appeal is important in the physician's office. An awesome collection of pipes, gauges, tanks and valves lends a "chamber-of-horor" appearance that can create a troubled mental condition difficult to detect and cure. The design, made possible by die castings does much to eliminate or minimize undesirable appearance.

The sterilizer must heat and cool rapidly and must not dissipate much heat into the room. The proper selection and design of the cast parts also helps here.

Simplification of machining and surface finishing are important in holding the cost of manufacturing down. The castings are designed with almost all of the fastening devices "built in." By good design, only such low cost machining operations as drilling, tapping and light surfacing are needed to finish the parts. The baked enamel finish can be applied to the as-cast surface without any mechanical preparation. For good paint adhesion, a chemical conversion coating is applied first, followed by a prime coat and then a finish coat of enamel.

This sterilizer again shows the importance of close cooperation between designer and casting manufacturer. The Wilmot Castle Co., of Rochester, N. Y., knew what properties, both operational and appearance, were the most desirable. The Precision Castings Co., in turn, was able to say which parts could be most economically die cast and to offer design suggestions to improve the performance and the eye-appeal of the complete unit.

PRECISELY MADE and with excellent surface finish, the die cast components of this sterilizer give strength.

The six different castings used are shown in the illustrations on the left. The largest is the back housing (figure 3) which weighs 5¼ lbs. and is 14 x 18 inches. It is cast in aluminum as are all other castings except the instrument bezel (figure 1) which, because it is chromium plated, is a zinc die casting.

Once a machined cam, they switched to powdered iron and soon discovered that . . .

Sinterings Save Time And Money

BASED on favorable experience with powdered metal bushings, when a difficult problem in the manufacture of a governor speed control cam arose, the Doremeyer Corp. turned to sinterings.

The cylindrical part needed both a longitudinal slot to prevent turning and a spiral slot to give a forward and backward motion to the speed control device on a household mixer. Obviously, this cam could be made by milling the desired slots into a piece of wrought stock, but the number of operations involved and the cost of some of these operations made this method of manufacture highly uneconomical.

Equally obviously, the piece cannot be made in a single pressing operation as a sintering. The cylindrical shape with the longitudinal slot and the center bore can all be formed. The spiral slot, however, must be formed as a separate machining operation.

In spite of the required second operation to form the spiral, the cost of manufacturing the part as a sintering is lower.

As a bonus that could come only from using a sintering, the part can be impregnated with oil so that it will be adequately lubricated for the life of the mixer. Thus far such impregnation has not been found necessary.

Tables I and II show how the manufacturing process has been simplified through the use of this sintered part.

BEFORE: When using the machined cam, these operations had to be performed on steel bar stock. The result — high machining costs and excessive scrap losses with consequent high piece costs.

AFTER: By conversion to sinterings the machining operations were cut to these two simple operations. The result — very low machining costs, practically no scrap losses and low piece costs.

TABLE I

MACHINED STEEL

No.	Operation
1.	Cut-off to length
2.	Drill center hole
3.	Grind O.D.
4.	Slot for spiral
5.	Broach key-way
6.	Drill and tap for set screw

SINTERED CAM (left) is delivered by the fabricator ready for use after a simple drilling and tapping operation. Minor clean-up may be required.

TABLE II

SINTERING

No.	Operation
1.	Clean-up slot if needed
2.	Drill and tap for set screw

SINTERINGS

Vacuum Sintering

Part 1 Theory and practice

By HENRY H. HAUSNER*

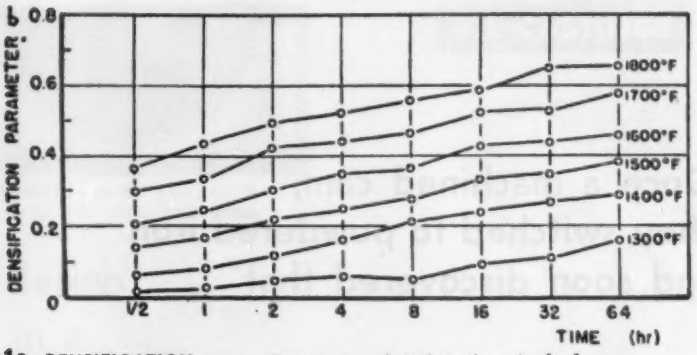
INTRODUCTION

The properties of sintered metal powder compacts depend on the type of metal powders, their process of fabrication, particle size and shape, on the compacting conditions, and the variables of the sintering process.

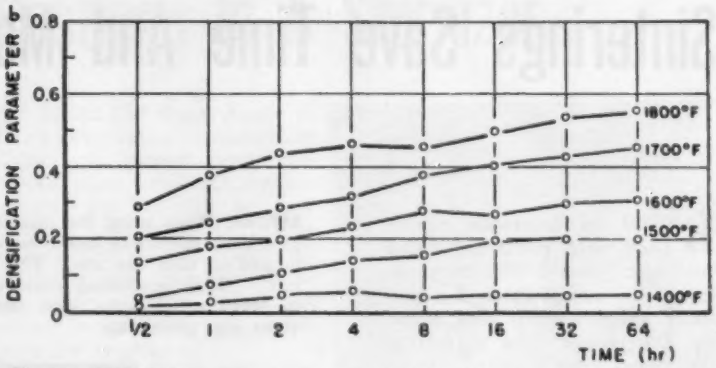
The physical properties obtained during sintering depend on many variables. This paper deals exclusively with one of these variables — the sintering atmosphere — and especially with the role of vacuum as sintering atmosphere.

During sintering a material transport takes place from one particle to another, which results first in bonding and then in densification, recrystallization, and grain growth. These are the main factors which determine the physical properties of the sintered product.

*Vice Pres., Nuclear Eng. Div.
Penn-Texas Corp.



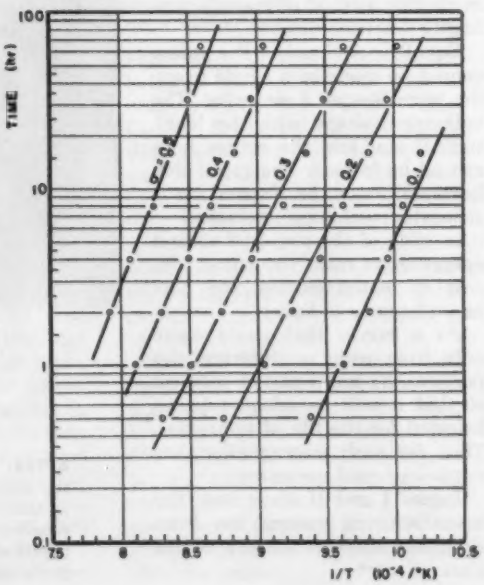
1a. DENSIFICATION parameter versus sintering time in hydrogen.



1b. DENSIFICATION parameter versus sintering time in vacuum.

SINTERING OF COPPER IN VACUUM

Duwez and coworkers studied the effect of sintering copper powders in vacuum and hydrogen, respectively, on the densification of the compacts during sintering. The maximum density



2a. RELATION between time and reciprocal of temperature for values of densification parameter; H_2 sintering.

a powder compact can attain is obviously that of the solid metal. This circumstance provides a natural scale on which the progress of densification can be measured. By comparing the observed change in density during sintering with the maximum possible change, a convenient dimensionless parameter can be obtained, the value of which is zero at the beginning of the sintering process, and which becomes unity if the compact attains maximum possible density. This "densification parameter" σ, is defined as follows:

$$\sigma = \frac{d - d_0}{d_m - d_0}$$

where d = density after sintering
d_0 = initial density of green compact
d_m = Maximum-(theoretical) density of the solid metal.

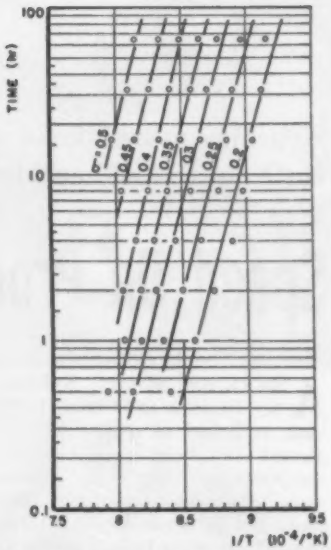
Figs 1a and 1b refer to the compacts made from surface-oxidized (as received) copper powders, and show clearly that the densification parameter is considerably greater when the specimens are sintered in hydrogen. This is especially true for specimens sintered at low temperatures.

The relation between sintering temperature and time with respect to the densification parameter is again shown in the graphs, Figs 2a and 2b, which permit the interpretation of densification as a rate process, such as is involved. for example, in chemical reactions. Rate processes are characterized by the fact that if a given state is attained in a time, t_1, at absolute temperature T_2, then the four quantities are connected by the relation

$$\log \frac{t_1}{t_2} = \frac{Q}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right) \quad (2)$$

where R = gas constant (1.99 cal/mol °C)
Q = molal heat of activation (activation energy)

The "given state" in the case of sintering refers to the degree of densification during sintering, and the densification parameter, σ, consequently decides whether densification may be regarded as a rate process or not. For this it is necessary to plot the curves of constant σ on a graph of log t (sintering time) vs. 1/T (T = sintering temperature °K). If equation (2) is to be satisfied, straight lines must result. Figs 2a and 2b show these curves of constant σ plotted in this fashion with the best fitting straight line drawn through each set of points for comparison. The constant σ lines form an approximately parallel set for each sintering temperature used but with different slope for hydrogen and vacuum sintering. Calculations showed



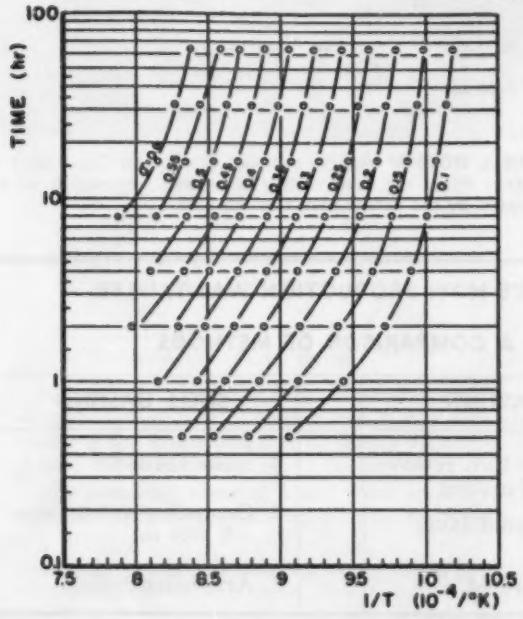
2b. RELATION between time and reciprocal of temperature for values of densification parameter, vacuum sintering.

that the activation energy "Q" is about 128,000 cal/mol for vacuum sintering, and only 80,000 cal/mol for hydrogen sintering, corresponding to the fact that a given temperature and time produce a lower value of σ in vacuum than in hydrogen.

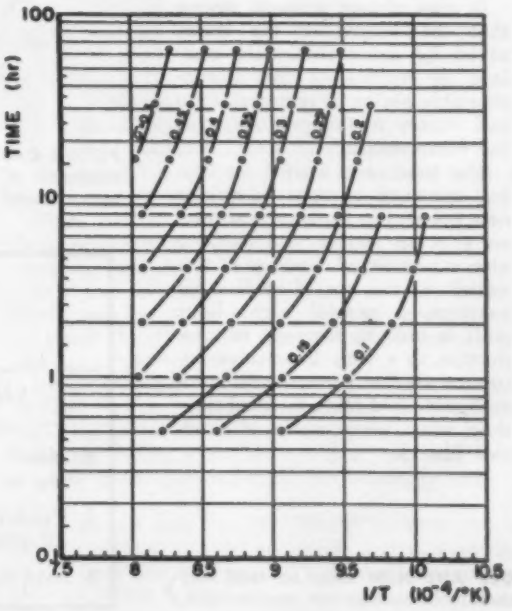
The second series of Duwez' experiments was made with the

Continued on page 88

3a. RELATION of time, reciprocal of temperature for densification parameter values; vacuum sintering.



3b. RELATION of time, reciprocal of temperature for densification parameter values; H_2 sintering.



Switching to shell mold castings cut scrap loss and enabled this company to . . .

Speed Up Production of Compressor Pistons

AMERICAN Motors' Kelvinator Division in Detroit, Michigan, switched to shell-mold cast pistons in their new compact compressors. Sand-cast pistons were abandoned because they could not be made to close tolerances. They must be cast oversize. This makes the rough castings heavier. Worse yet, the excess metal must be cut away.

As much as one-eighth of an inch of metal must be machined off the sand-cast pistons before moving them to the centerless grinder for finishing. This waste was costly.

The advantage of shell-mold castings is impressive.

The blanks come into the plant at close-to-finish size. They move directly to the centerless grinder which grinds them to final diameter.

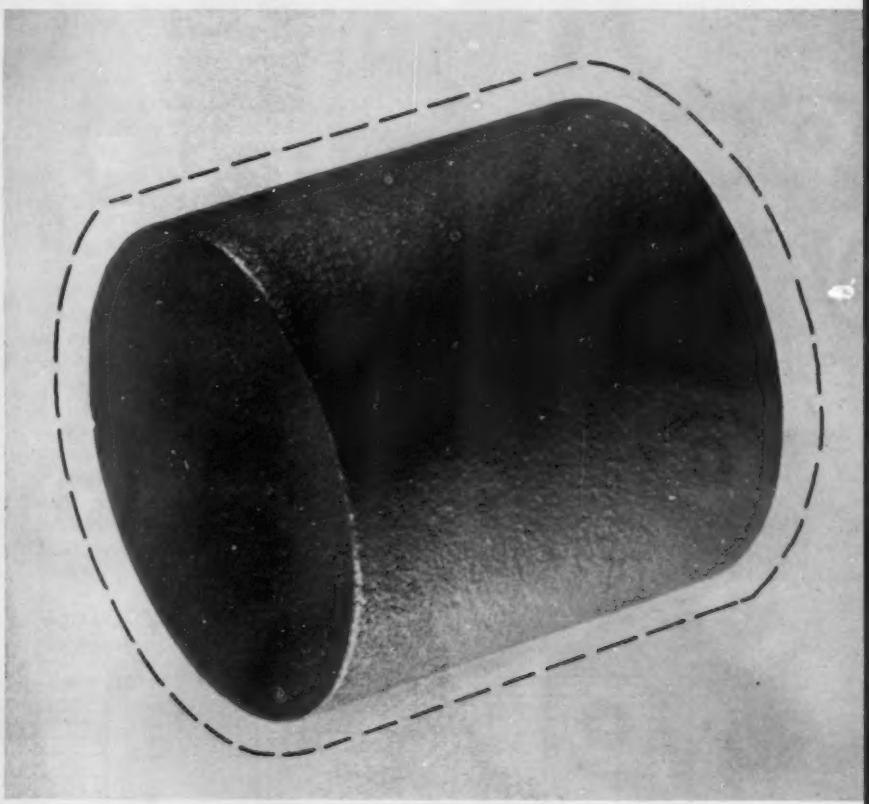
Approximately 0.030" is removed.

The blanks then have the armholes drilled. The job is done.

It goes almost without saying that the weight of the metal saved by using shell-mold castings is responsible for a considerable saving of material, time and money in the production of the compressors.

The time once wasted machining the sand castings to size is now saved. The excess metal used as a scrap source and nothing else, is now saved. Because of this switch to the use of shell mold castings, a normal eight hour shift is able to increase its production to a very impressive figure. And the pistons are more acceptible and more finished than they were when made of sand-cast blanks.

OLD AND NEW facts on sand and shell mold castings are seen at right.



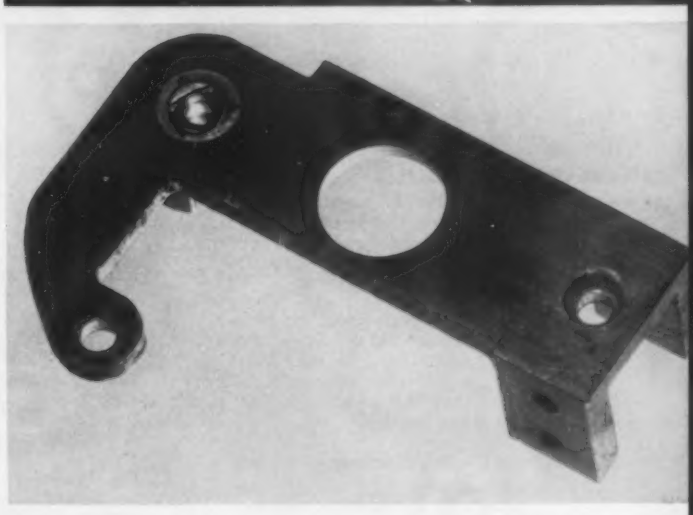
PISTON CAST IN SHELL MOLD is used in compact compressor head after a minimum of machining. When the sand casting was used, one-eighth of an inch of metal represented by the dotted line, was cut away.

HERE'S HOW PRODUCTION WAS TRIPLED

A COMPARISON OF METHODS

SAND CASTING		SHELL CASTING
1. Needs rough turn removing ⅛ in. off casting.		1. *None* needed.
2. Centerless grind takes off .030 in.		2. Centerless grind takes off .030 in.
3. Arm holes drilled.		3. Arm holes drilled.

STAMPING: 6 OPERATIONS . . . used to make this part seen at right have been studied and analysed. This resulted in a . . .



REDUCTION TO 3: WITH DIE casting. The final result of research, and application of these results can be examined at the right.

Using Die Castings Cut Costs 63%

Herbert Piotter*

DIE-CAST zinc dial bridges cut production and assembly costs of some of the telephones we make at Stromberg-Carlson. Bridges used to be born as punch-pressed stampings. They went on to be:

1. Blanked and pierced.
2. Formed.
3. Drilled.
4. Reamed.
5. Drilled again.
6. Tapped.
7. Chamfered.
8. Tumbled to remove burrs.

It was little wonder that we scouted around for a cheaper way of making these parts. It was only after research and evaluation that we finally decided to use a zinc die casting.

The following account is the short and sweet recording of the birth of a zinc, die cast dial bridge.

*Production Engineer, Stromberg-Carlson, a Division of General Dynamics Corporation, Rochester, New York

1. Casting is made.
2. It is drilled.
3. Holes are tapped.
4. It is tumbled to remove the flash.

But these benefits do not come without some expenditures. We did have to buy the die.

Then we had to buy the drilling jig and barrel. Savings in cost began showing up to counteract this however, and we were glad for the change.

Our cost accountants informed us, after being in production for a short time, that the new, die cast part cost 63 percent less than the old, brass, stamped one.

In fact, the cost accountants informed us that the savings on the first 24,000 would pay for the needed retooling to get the process under way.

Added bonus was the fact that the cast bridge needed much less attention for assembly than the other.

We picked zinc for the casting because the machining operations for brass made a stumbling block of the costs and hampered the over-all production of the telephonic equipment.

DATA OFFERED IN THIS MONTH'S ADS

the Reader Service Cards on the facing page will get you these free reference materials. Circle the numbers and mail.

2. Die Casting Machines — Bulletin P-10 from ABC Die Casting Machine Co., provides complete engineering data and prices on the company's line of small die casting machines.

3. Die Casting Supplies — An illustrated bulletin from ACF Industries, Inc., describes their complete line of pots, utility castings, goosenecks and ingot molds.

5. Precision Die Castings — "Your Doorway to Certified Zinc and Precision Aluminum Die Castings," is the title of a new brochure from Advance Tool and Die Casting Co. The company's know-how in die casting design, engineering and production is covered.

9. Plunger Rings — Complete technical details are available from The Auto-Diesel Piston Ring Co. on hardened steel plunger rings that will give up to 100,000 shots per set.

10. Die Casting Machines — A complete catalog is available from American Die Casting Machinery Co., showing their complete line of die casting machines for zinc, tin and lead. Illustrations and prices are included.

11. 13 Models — of die casting machines for zinc, aluminum and brass, are described in bulletins from B & T Machinery Co. Designed and built to specification, the machines range in capacity from 100 to 750 tons.

12. Sintered Powder — products; their composition, manufacture and application, are discussed in a 24-page engineering handbook published by Bunting Brass and Bronze Co.

14. Corrosion Resistance — far above normal melting temperatures, possible because of Refrax silicon-nitride-bonded silicon carbide, is discussed in the latest product bulletin and technical articles on Refrax materials, from the Refractories Div., Carborundum Co.

15. Small Die Casting Machines — A Brochure from Cast-Master, Inc. gives full details and specifications on two new die casting machine models; the 7Z for zinc, tin and lead, and the 7A for aluminum, magnesium and brass.

17. Ferrous, Non-Ferrous Investments — Information, specifications and prices are available from Centrifugal Casting Supply Co. on six "Whip-Mix" investments for ferrous and nonferrous casting.

18. Powder Metal Parts — Detailed information from Chrysler Corp., Amplex Div. describes their line of powder metal components — "Oilite" bearings, parts, and filters.

19. Die Casting Machine — Bulletin 600 from The Cleveland Automatic Machine Co. describes their new model 600 die casting machine, built to deliver castings weighing up to 10 lbs. in aluminum and 25 lbs. in zinc.

20. High-Vacuum Furnace — Bulletin No. 4-30 from Consolidated Electro dynamics Corp. gives complete specifications, accessories, and design features of a high-vacuum furnace for either laboratory or production.

23. Die Casting Complicated Shapes — with Tadanac Zinc; an alloy which is ideal for low temperature high speed operation, and has the essential tensile strength and freedom from corrosion, is discussed in information from Consolidated Mining & Smelting Co. of Canada Ltd.

27. Screw-In Thermometers — Bulletin No. 5 from W. C. Dillon & Co., Inc. gives complete engineering data and price information on their dial thermometers which can be screwed into equipment or floated on liquids.

31. Shell Molding Problems — are answered in a brochure, "59 Answers to Your Shell Molding Problems," by General Electric Co. A description of G-E resins and their properties is included.

32. Product Designer's Kit — for designers and production men is being offered by Gries Reproducer Corp. Its purpose is to acquaint these men with the almost unlimited scope of small parts design.

33. Briquetting Presses — Design and engineering data sheets are available from Haller, Inc. on their hydraulic and mechanical briquetting presses built for speed, accuracy and economy.

34. Aluminum Die Casting — A brochure entitled "Behind the Scenes" contains a complete digest of Hampden Brass & Aluminum Co.'s experience, equipment and facilities.

35. Die Casting — "Die Casting With Zinc Base Alloys," is the title of the new revised guide from Henning Bros. & Smith, Inc. The factors influencing the production of good castings: alloy composition, temperatures, metal injection pressures, gating venting, etc., are presented along with other technical data.

36. Investment Casting Design — A brochure has been published by Hitchiner Mfg. Co. to aid the engineer in designing for the best and most economical use of investment castings.

37. Sintering — The new cooperative effort between powdered metal parts producers and Hoeganaes Sponge Iron Corp. for the testing of sintering conditions is explained in Literature No. 108, from the company.

39. Die Casting Machine — Detailed information on the new H-P-M 800-ton die casting machine, which features high production, excellent surface finish, and minimum scrap loss, is presented in Bulletin 5700 from Hydraulic Press Mfg. Co.

40. Sintering Furnaces — for controlled atmosphere or vacuum sintering are described in bulletins 357 and 557 from the Hevi-Duty Electric Furnace Co. Technical information is provided to help determine the best furnace for individual sintering requirements.

42. Investment Castings — How savings can be made on simple as well as complex investment castings is outlined in a new manual from Jelrus Precision Casting Corp.

43. Die Casting Machine — that can cast up to 6 pounds of zinc or make from 400 to 500 shots per hour is described in Bulletin 101 Lester-Phoenix, Inc. Technical information is given on the "one-adjustment" zinc end and central die height adjustment.

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8	25	42	59	76	93	110	127	144	161	178	195	212	229	246	263	280	297
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12	29	46	63	80	97	114	131	148	165	182	199	216	233	250	267	284	301
13	30	47	64	81	98	115	132	149	166	183	200	217	234	251	268	285	302
14	31	48	65	82	99	116	133	150	167	184	201	218	235	252	269	286	303
15	32	49	66	83	100	117	134	151	168	185	202	219	236	253	270	287	304
16	33	50	67	84	101	118	135	152	169	186	203	220	237	254	271	288	305
17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306

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4	21	38	55	72	89	106	123	140	157	174	191	208	225	242	259	276	293
5	22	39	56	73	90	107	124	141	158	175	192	209	226	243	260	277	294
6	23	40	57	74	91	108	125	142	159	176	193	210	227	244	261	278	295
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8	25	42	59	76	93	110	127	144	161	178	195	212	229	246	263	280	297
9	26	43	60	77	94	111	128	145	162	179	196	213	230	247	264	281	298
10	27	44	61	78	95	112	129	146	163	180	197	214	231	248	265	282	299
11	28	45	62	79	96	113	130	147	164	181	198	215	232	249	266	283	300
12	29	46	63	80	97	114	131	148	165	182	199	216	233	250	267	284	301
13	30	47	64	81	98	115	132	149	166	183	200	217	234	251	268	285	302
14	31	48	65	82	99	116	133	150	167	184	201	218	235	252	269	286	303
15	32	49	66	83	100	117	134	151	168	185	202	219	236	253	270	287	304
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Finishing Section

The specialized finishing methods, equipment and materials used to machine, assemble, surface condition or surface coat precision metal molded parts are presented here. This includes all secondary operations which convert a raw casting to a finished product.

A Completely Integrated Finishing System For Die Castings ... see page 51

This is a plain Ruff-L-Buff after wearing off about one inch in testing operations and then trimming. Loose threads, broken material and numerous small holes due to excessive heat and abrasion of the cloth are apparent.

30% LONGER BUFF LIFE

The Binderized Ruff-L-Buff shown here was subjected to the identical test undergone by the untreated buff — yet look at the difference! Notice the absence of thread or cloth breakage, of any kind, proof of Binderizing's effect on buff life.

with H-VW-M Binderized* Ruff-L-Buffs®

Not just "another type of buff," but a revolutionary H-VW-M process which impregnates the entire Ruff-L-Buff with the same organic binder used in buffing compounds. From these "Binderized" Ruff-L-Buffs come a host of practical, cost-cutting advantages, proved over many months in actual production line operations.

Item by item, these are the six major advantages of the H-VW-M Binderized Ruff-L-Buff.

- **Longer buff life** — damage from overheating eliminated by pre-lubrication of buffing material, preventing excess frictional heat caused by constant flexing. This additional buff life has averaged 30% in actual test runs.
- **Better compound adherence** — the binderizing impregnation creates an affinity between buff and compound. The compound does the cutting, not the buff.
- **Faster cutting action** — more compound is retained on the buff, insuring an even cut for a longer period without re-application of compound.
- **Extended composition life** — additional binder in the cloth ensures better abrasive adhesion, longer life of both composition and buff.
- **Heading-up time** — new wheels require only application of the compound to be ready for immediate operation.
- **Cooler running** — in addition to pre-lubrication, six holes in the center and twelve air channels in the center rim provide a forced air circulation over all cloth surfaces.**

And, of course, Binderized Ruff-L-Buffs retain such important features as *bias-cut cloth* to prevent unravelling, *perfect buff balance* for uniform rotation and wear, and *exclusive Red-E-To-Use face* that takes compound without need for surface preparation.

H-VW-M bias-cut Sisalweev buffing wheels are also available in Binderized types.

* Patent Pending
** Patent No. 2,140,208

For complete information on H-VW-M Binderized Ruff-L-Buffs and other specialized buffs write for Bulletin No. B-102. **Hanson-Van Winkle-Munning Company, Matawan, New Jersey. Offices in principal cities.**

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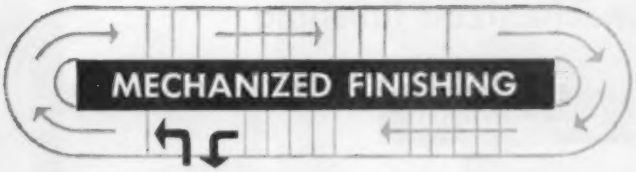


This is how one company gets . . .

Centralized Control From Ingot To Finished Product

THE mechanized finishing of die castings has become a highly important phase of the jobbing die caster's business, it is equally important to the purchaser of large numbers of castings. Outstanding examples of this are the automotive and appliance industries and the foundries which supply them with zinc and aluminum die castings.

The Grand Rapids Brass Company, Division of Crampton Manufacturing Company is one of the growing number of jobbing foundries that has geared its entire output to these high volume consumers. This company is concerned only with those zinc die casting jobs that run to hundreds of thousands of duplicate pieces, all of which are surface finished by either chromium plating or painting.

Some idea of the size of this operation can be secured when it is realized that over the past several years the average annual sales of the company have been about $14,000,000. Three manufacturing plants are operated with a combined manufacturing floor space of 236,500 sq. ft. and an additional 104,000 sq. ft. of warehouse space.

The die casting department operates 27 machines, each with an an associated trim press and usually some light machining facilities immediately adjacent to the casting machine and trim press.

Buffing and polishing of all castings is done in a separate plant, while surface finishing and light assembly is done in a third plant.

Within each plant mechanical handling is done wherever possible, chiefly with belts, roller conveyors and overhead hook line conveyors. In some instances it is necessary to use trucks for transportation within a plant, but this is minimized.

Since most of the castings made by this company are used either as purely decorative items or as both decorative and utiltarian parts, it is essential that all castings start with a hardware finish.

One of the more important departments is the design engineering. Grand Rapids Brass maintains a large staff of skilled engineers who work closely with the customers to achieve designs which will be functionally correct and can be processed at the lowest possible cost. These engineers must help to secure a design which can be cast economically and, at the same time, a design that lends itself most easily to fully automatic finishing operations.

The following three articles describe operations in each of the three plants. Each one could operate. in its own field, as a completely separate entity. As a whole they represent an extremely highly developed, completely integrated unit where responsibility, from ingot to finished component, is centralized in one manufacturing operation.

Recent articles on automatic finishing in PRECISION METAL MOLDING.

Plan Your Automatic Transfer Machine With Standard Components—January, 1956

Drilling And Tapping 1000 Pieces Per Hour—May, 1956

Polishing And Buffing Of Die Castings—June, 1956

Barrel Finishing In A Job Plating Plant—July, 1956

Hot Spray Painting: How And Why To Use It—September, 1956

Efficient Fnishing . . . Key To Competitive Toy Manufacture—December, 1956

Sixteen Operations In Nine Seconds—January, 1957

How Westinghouse Finishes Fry Pans—January, 1957

This Is Barrel Finishing—February, 1957

Machines For Coated Abrasives—March, 1957

A Completely Automatic Finishing Department—March, 1957

Mechanized Finishing Of Die Castings—September, 1957

52 Automatic Buffing and Polishing

54 Automatic Plating

56 Spray Painting and Masking

DIE CASTINGS

Automatic Buffing And Polishing

1 CASTING, trimming, reaming and tapping automobile parking lamp housings. When the castings leave this station they are ready for polishing.

ALL mechanical operations, including the die casting, are performed in one plant. The trim presses are set up adjacent to the die casting machines so that a minimum of handling is required. In many cases, the trimming may be done while the casting is still warm. This is particularly advantageous when there is a tendency for the castings to warp while cooling.

On most castings there are small holes to be drilled and tapped. Where single spindle machines can be used and where extensive drill jigs are not required, these operations are set up immediately adjacent to the trim press (figure 1).

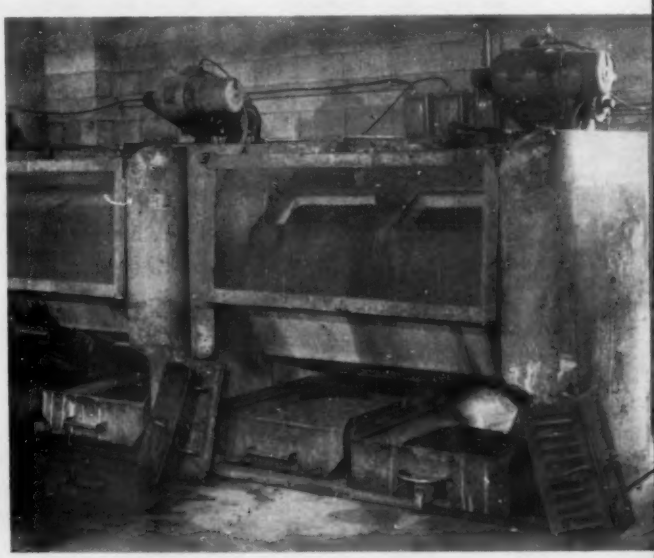
The trimmed and either fully or partially machined castings then go to final machining. Here multiple spindle machines, some requiring complex jigs and fixtures are used. Any type of machining operation called for may be done. One feature of special note in the machining line is the use of standard components to build up special units. These standard components are shelf items, carried in stock, and are used over and over again as the need arises for them (figure 2).

The use of special machines can, of course, be justified only when the number of individual pieces to be machined is very great; here is the basic premise of this entire operation, the casting, machining and surface finishing of large numbers of duplicate parts.

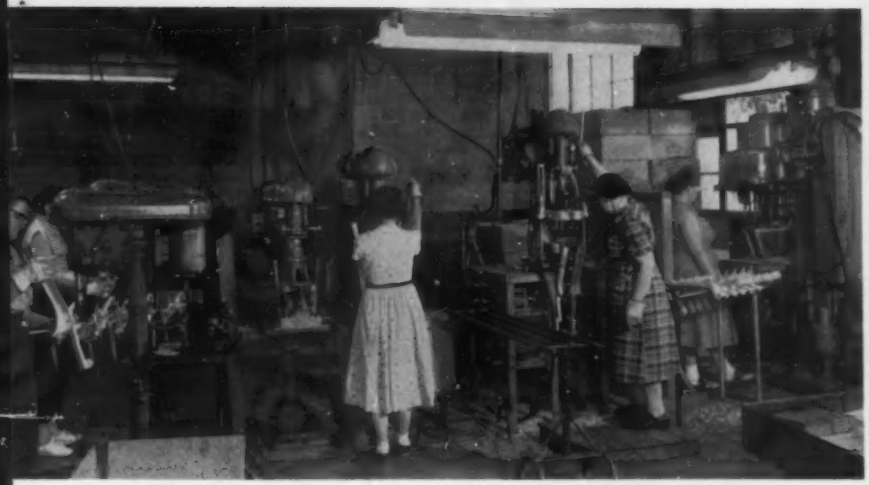
Despite the care exercised in design, there are some components whose functional requirements demand a design that cannot be polished and buffed on automatic equipment. For such parts a series of polishing lathes, some with back-stand idlers and some with buffs mounted on the lathe spindle are used. These lathes are set up in groups of two or more so that parts of different style and requiring different surface treatment can be finished in a straight line operation without requiring mechanical transport from station to station. Figure 3 shows one such operation.

Another group of parts are those that are small enough to allow barrel finishing. A bank of finishing barrels that utilizes mechanical loading and unloading and manual transfer is used. Up to now there has not been a sufficiently large volume of work that can be done in barrels to justify the installation of mechanized barrel finishing equipment. Figure 4 shows a portion of this barrel finishing line.

For those parts, and they constitute a majority, that can be buffed and polished automatically, equipment such as shown in figures 5 and 6 is used. Special note should be given the polishing heads. These heads can be moved along the polishing line to any desired position. The angle of attack, the height above the bed and the lateral position are all adjustable. With this



4 BARREL finishing is used where the parts are small enough to make this method most economical. In some cases the economy of barrel finishing is the difference between profit and loss in making the part.

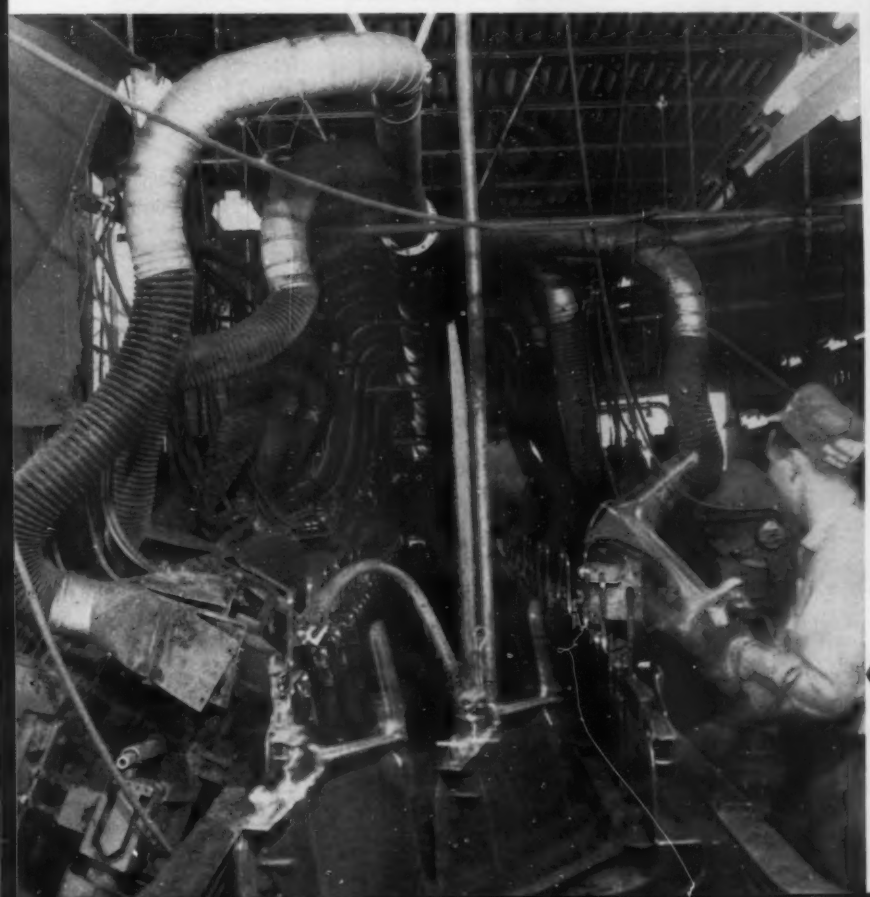


2 MACHINING an automobile vent window frame. Here, five different operations are done. Note that the machining equipment is set up for in-line operation.

3 POLISHING and buffing automobile vent window frames.

high degree of flexibility it is generally possible to accommodate the equipment to polish any surface. As the parts move around the machine the abrasive and the compound used become progressively finer so that when the casting is finally removed from the automatic polishing line it is ready for final finishing, usually chromium plating.

For a listing of the companies who furnish equipment and supplies for this operation see page 66.



6 CLOSE-UP of one of the buffing wheels. Here the number of motions for positioning is evident.

5 STRAIGHT-LINE polishing and buffing using 10 large (15 HP) heads and six smaller (7½ HP) heads. Liquid compound is used and fed automatically. The machine can finish 4000 pieces per shift.

mechanized finishing

DIE CASTINGS

Automatic Plating

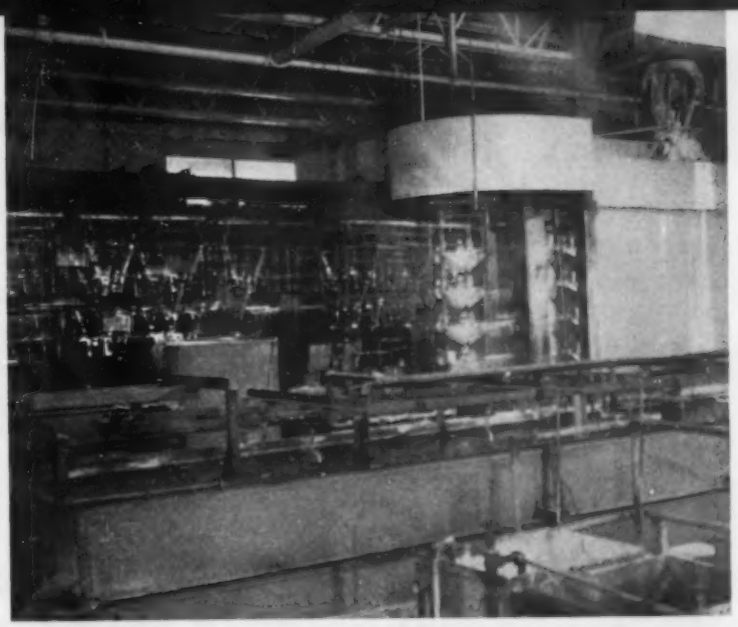
AFTER all mechanical operations such as machining, buffing and polishing have been completed, the castings are ready for final surface finishing, either plating or painting.

In the plating department almost fully automatic operation is used. When the castings come into the department they are placed on racks with special holding fixtures that have been specifically designed for the parts to be held. Once racked, they will not be removed until they have completed the entire circuit of the plant and are ready to go to either assembly or shipping.

A total of 28 operations are involved, not including unloading and stripping of the racks. These are:

1. SOAK — Di phase soak, 6½ minutes, 165-170F, water phase 1 to 2 oz. per gal. Northwest #471 solvent phase 2 to 4 inches Northwest solvent.
2. SPRAY WASH — 1st stage clean water, second and third stages proprietory cleaner 1 to 2 oz. per gal. at 130F, 4th stage clean water.
3. SOAK — 1 minute in Northwest #471, 5 to 7 oz. per gal., 130F.
4. ELECTRO CLEAN — Alkaline solution, Northwest #32, 11 to 12 oz. per gal., 130 to 140F. 1 min., 4-6 volts, 15 amps. per sq. ft.
5. RINSE — water rinse with spray type skimmers.
6. WATER RINSE — repeat of operation 5.
7. ACID DIP — 18 seconds in 1 to 1.25% sulfuric acid.
8. RINSE — repeat of operation 5.
9. COPPER STRIKE — 3 minutes, 120F, 2-4 volts, 30-40 amps. per sq. ft. in alkaline cyanide copper solution.
10. COPPER PLATE — 26 minutes, 155-160F, 20-30 amps. per sq. ft. in Wagner Isobrite copper solution.
11. RECLAIM RINSE used to maintain level in high speed copper.
12, 13. RINSE — repeat of operation 5.
14. ELECTROCLEAN — Northwest #52 cleaner, 8 oz. per gal., 140-150F, 6 volts, 30 amps. per sq. ft.
15. RINSE — repeat of operation 5.

1 **TRANSFER** of parts from the cleaning line to the plating line is manual. When plating is completed the rack of parts will return to this station and be transferred to the overhead line going to the loading and unloading.



2 CONTROL at every stage of cleaning and plating is imperative. This laboratory is fully equipped to analyze plating and cleaning solutions and to run salt spray and thickness tests on the metal.

3 SOAK cleaning and spray cleaning are both used to insure a chemically clean surface prior to plating. Even minute specs of oil or other soil will spoil the job.

16. ACID DIP —4 percent sulfuric acid.
17. RINSE—repeat of operation 5.
18. BRIGHT NICKEL — Harshaw Nubrite nickel, 50 amps. per sq. ft., pH 3.5 to 3.8.
19. RECLAIM RINSE — used to maintain level in nickel tank.
20, 21, 22. RINSE—repeat of operation 5.
23. CHROMIC DIP — One oz. per gal. of Unichrome CR110.
24. CHROMIUM PLATE — five minutes, 100-102F, 5-7 volts, 0-110 amps. per per sq. ft., Unichrome SRHS solution. For difficult plating jobs, auxiliary anodes are used.
25, 26, 27. RINSE — these are backflow rinses to disposal.
28. RINSE — demineralized water at 130-140F.

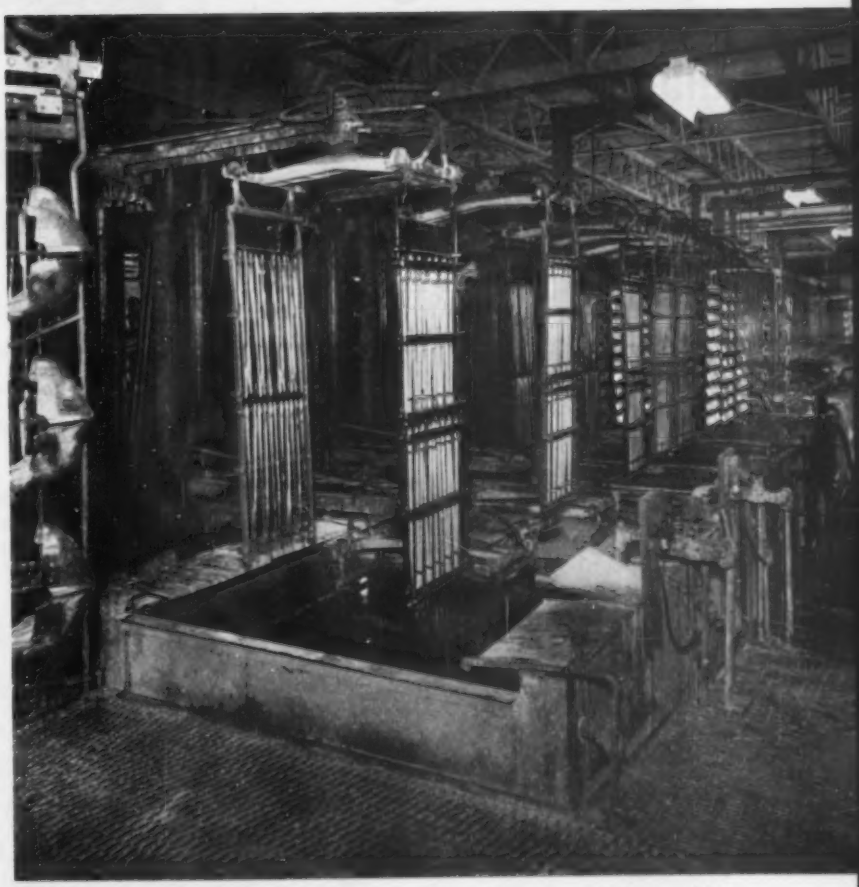
Two automatic plating units are installed, one for parts that are to be used for exterior service and the other for parts to be used for interior trim. The larger unit for exterior work is 146 feet long of the two lane return type. The buffed and pre-cleaned castings are racked on 66 in. long plating racks with a 22 in. x 14 in. x 54 in. plating box. Conveyor speed is 6 ft. per min., equivalent to 150 racks per hour.

Pre-cleaning, steps 1 and 2 above, are on a separate unit and as the racked parts come from the cleaner they are manually transferred to the plating machine. All subsequent operations are automatic.

The automatic plating machine has tanks 66 in. wide and 72 in. deep. They vary in length depending on the operation being performed. Each arm is equipped with a rocker so that agitation is obtained in the copper and nickel tanks. The copper, nickel and chromium tanks are equipped with a third rail and each arm has a suitable current pick up so that auxiliary anodes may be used.

The unit for plating castings for interior use is practically identical to the one just described.

Continued on page 63



4 FULLY AUTOMATIC, this 146 ft. long, two lane return type plating machine combines copper, nickel and chromium plating facilities as well as all needed cleaning and washing tanks. Capacity, 150 racks per hr.

mechanized finishing

DIE CASTINGS

Both manual and automatic methods in . . .

Spray Painting and Masking

1 SPRAY PAINTING of an automobile horn ring on an automatic machine. In this case, the paint is applied, with a masking fixture, to a previously chromium plated part.

SPRAY painting of zinc die cast parts at Grand Rapids Brass Company can be divided into two classes. One is the painting of unplated parts, such as TV bezels, and the other the decoration of chromium plated parts. In the latter case, much of the painting is done with masks.

Unplated parts are either degreased before painting, or are given the phosphate conversion coating to provide added corrosion protection and furnish adequate "tooth" for the enamel. In the latter case, the ware is handled on a monorail conveyor for transfer from the phosphatizing area into and through the paint shop.

Painting of unplated parts is done entirely by hand-held spray guns at this time, although the acquisition of electrostatic painting equipment is being considered.

Spraying is done in both dry and water wash booths, all booths being coated with a peelable film for easy cleaning.

The organic coatings used on unplated ware are all of the baking enamel type. When more than one coat is required, as with primer and top-coat systems, the first coat is dried briefly before the second is applied, then the finished part is given a single bake to cure both applications.

Baking is done in one or more of three infra-red ovens having cycles of from five minutes at 350°F to twelve minutes at 250°F.

As in the case of chromium plated castings, the painted parts must meet rigid acceptance tests. The film hardness must be 2H, the paint must withstand up to 200 hours in a 100% humidity cabinet and 100 hours salt spray. Adhesion must pass both knife and tape tests.

The enamels used are modified alkyd types. Silk screen, dyed clear and metallic finishes can all be applied.

While most of the enameling is done in infra-red ovens, there are some cases where batch curing is preferred. For these, gas fired ovens are used. In this case, temperatures are carefully controlled with automatic thermostatic devices.

The second general type of parts that go through the painting department are those that have previously been chromium plated. Most of the paint applied to these parts is either fill-in or decorative enamel applied with masks.

The method of application will, of course, depend on the type of decoration to be applied. Masks can be hand held or fixed, and can be used with either hand held spray guns or automatic painting machines.

The paint materials used are low bake alkyd types, polyvinyl buteral, or alkyds reinforced with cotton — the so-called baking lacquer types. These coatings are cured in recirculating batch ovens at 220°F for up to 45 minutes at this temperature, or less where forced drying alone is required.

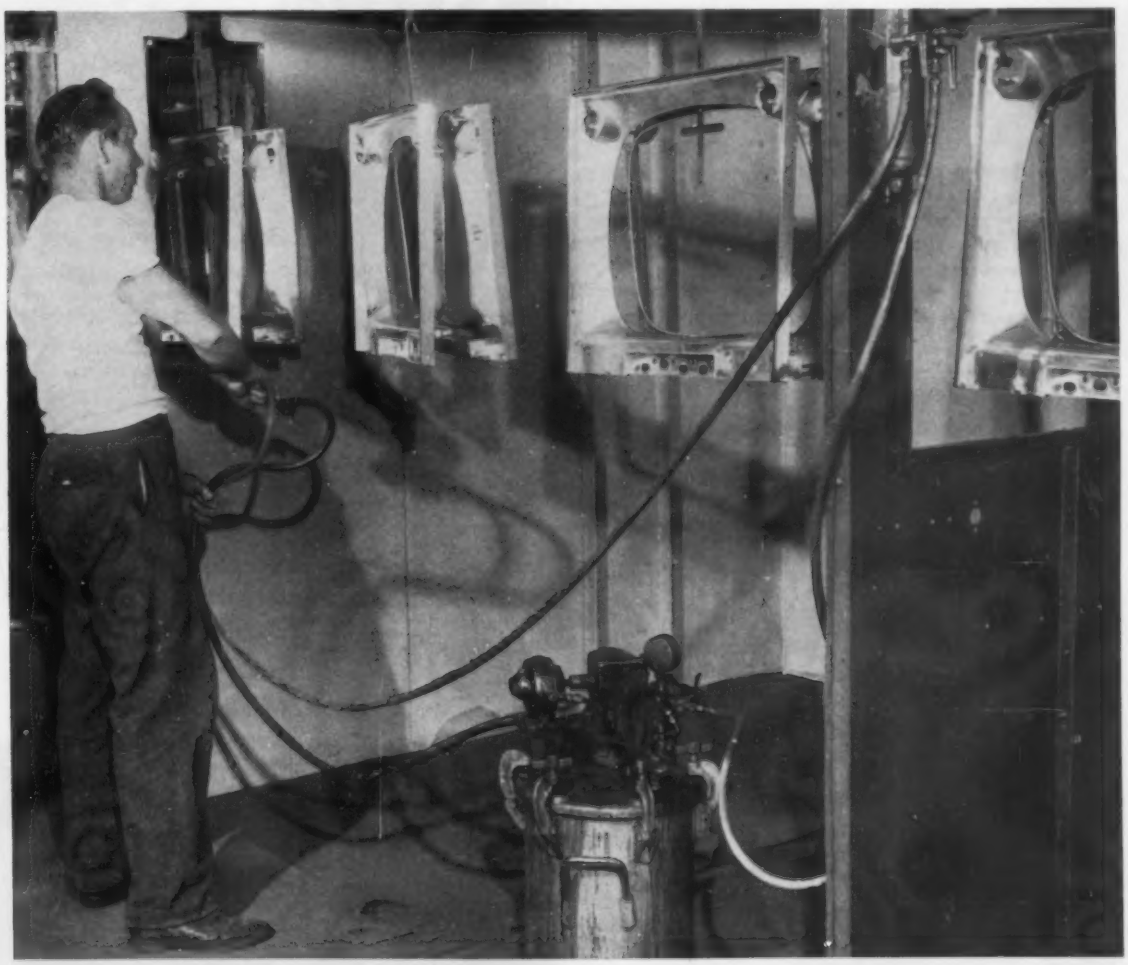
Baked enamel applied over chromium plate must pass the same rigid laboratory control as used for those parts that are not plated first, that is: hardness of 2H, up to 200 hours at 100% relative humidity, 100 hours in standard salt spray and adequate adhesion to knife and tape tests.

For a listing of the suppliers of paint equipment and supplies see page 66.

2 CONVEYORIZED spray painting on the main paint line. The castings are dried by banks of infra-red heaters after each operation.

3 SECOND COLOR application using a mask to contain the enamel within the desired area. Here, Roman Gold was the base color.

4 HIGH LIGHTS in the base coat are produced by first spraying with the desired color, in this case Roman Gold, and then hand wiping to secure the desired effect. When castings are to have this type of finish it is necessary to buff and polish prior to enamel application. If the as-cast surface were enameled and then rubbed, minute surface imperfections would become evident and cause high rejection rates.



DO YOU NEED BETTER METAL CLEANERS FOR THESE JOBS?

This 48-page illustrated booklet tells how to cut cleaning costs in aircraft production

1	**How to clean aluminum before anodizing.** See pages 4 to 8.
2	**How to prepare aluminum for welding.** See pages 10 to 14.
3	**How to prepare aluminum for painting.** See pages 15 to 19.
4	**How to clean aluminum before and after heat treating.** See page 20.
5	**How to strip paint from aluminum.** See pages 22 to 26.
6	**How to clean magnesium.** See pages 27 to 29.
7	**How to install cleaning tanks and spray-washing machines.** See pages 31 to 35.
8	**How to control overspray in paint booths.** See pages 36 to 37.
9	**How to clean engine test cells.** See page 40.

FREE Write for your copy of the booklet.

Technical Service Representatives in Principal Cities of U. S. and Canada

OAKITE

OAKITE PRODUCTS, INC.
340 Rector St., New York 6, N. Y.

Send me a FREE copy of "*How to clean metals in aircraft production*". I am especially interested in the jobs indicated by the numbers I have circled below:

1 2 3 4 5 6 7 8 9

NAME_____

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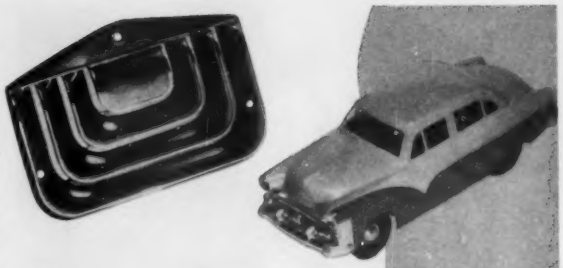

FIORE MASKS FOR PRECISION PAINTING

Spray decorating methods have improved so rapidly in recent years that you may not be aware of some time-saving, money-saving techniques now available. Today, special Fiore designed spray masks and fixture devices make possible single or multi-color decoration with precise registration on irregularly contoured products.

IF { your product is judged on appearance
you want best possible results
you want a minimum of rejections

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WM. M. FIORE INC.

269 41st Street Brooklyn 32, New York

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DIE CASTINGS

Now a standard machine replaces special equipment . .

Automatic Stud Driving

THE use of studs as fasteners for die cast parts has gained wide acceptance in the past few years. Studs are almost universally used on decorative mouldings and similar castings which must present finished surfaces that are uninterrupted by bolt heads or other fastening devices. The automotive parts industry in particular has made use of studs on castings for grilles, trade mark emblems and dash board trim. In most designs a blind, unthreaded hole is provided in the casting and a self tapping stud is used.

Because of the high volumes in which these stud equipped castings are produced it is desireable to utilize automatic driving machinery. In the past automatic machines have been developed to drive studs into a particular part. When that casting was redesigned it was necessary to scrap the existing machine and to design and build a new one capable of driving studs into the redesigned part.

An additional disadvantage of special stud driving machines was the time required to design and build them. Often, as long as six months was needed to provide a machine for a new casting. During the interim hand tools had to be used.

Since the driving operation was identical in all these machines and only the base and support configuration was changed the possibility of developing a standard unit that could be tied in with similar units to form a complete special machine suggested itself. Standard drilling units had solved a similar problem for special drilling machine manufacturers.

A standard unit presents two distinct advantages over a special purpose machine. First the units may be assembled to handle a particular job in a very short time. The longest time element in the tooling process then becomes the preparation of fixtures rather than building the machine. Secondly, at the end of a production run the units need not be scrapped but instead are regrouped in a short time to meet the requirements of a new operation.

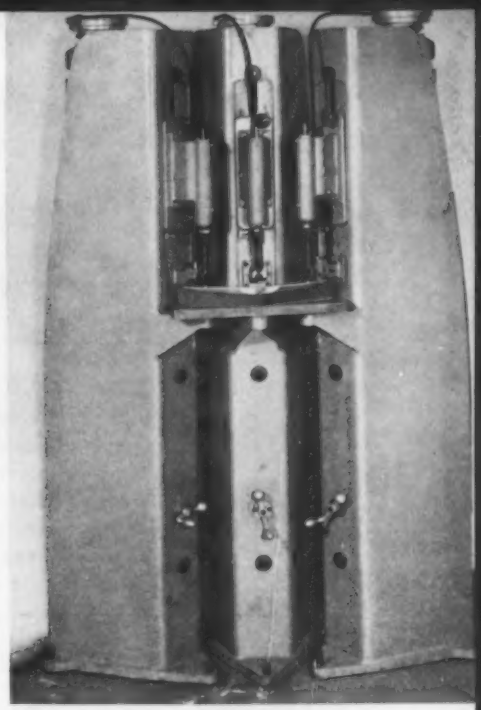
The central difficulty in designing such a machine was to achieve a unit that would drive one stud and which could be grouped with other units for multiple drive on close centers.

The Studrive unit meets this problem by providing a triangular cross-section which is followed along the entire height of the machine. No part of the machine falls outside of the triangle limits. The driving head of the machine is positioned on a vertical center line which falls within one inch of one point of the triangle. This configuration allows the units to be grouped with one another so as to drive studs on 2 inch centers with complete accuracy.

Figure 1 illustrates a few possible Studrive arrangements. The triangular base allows a wide variety of groupings without interference between the units.

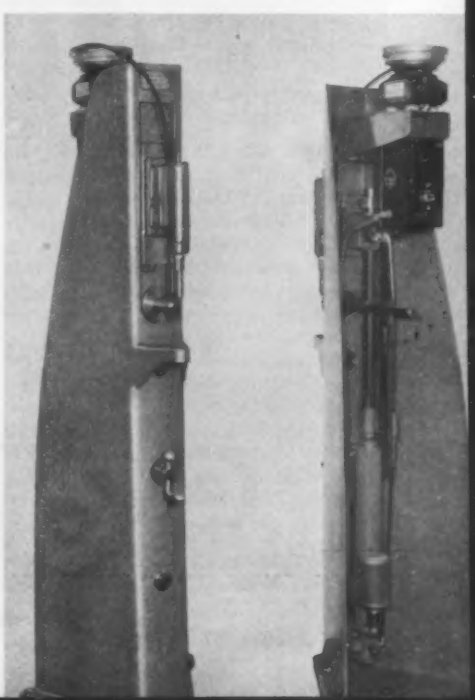
The units are operated pneumatically from a standard 80 p.s.i. line so that the installation is completed when air connections are made to each machine and to a master valve.

To avoid stripping the threads in the casting a lead screw is employed which, when rotated, produces a feed movement regulated by the pitch of the stud. Therefore, the stud is used as a tap, cutting its own threads.



1 By grouping the individual units along a holding fixture, multiple stud driving is accomplished as easily as single driving. Here, three units are used to drive studs into an automotive hood ornament.

2 A triangular base having one point on the centerline of the driving head allows the units to drive studs on two inch centers. The pneumatic cylinder powers a lead screw so that a true thread is cut. Studs can be removed and re-inserted if necessary.



Facts to consider when you're buying

Chromate Conversion Coatings

for Corrosion Protection, Paint Base, Decorative Finishing

WHAT IS IRIDITE®?

Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002" max.) gel-like, complex chromate film of a nonporous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.

If your company is manufacturing or buying parts or complete assemblies made from or plated with any of the more common non-ferrous metals—zinc, cadmium, aluminum, magnesium, silver, copper, brass or bronze—you've probably already run up against the question of finishing these surfaces with a chromate conversion coating. These coatings are used to protect against corrosion, or to provide a base for paint or to provide a decorative finish for sales appeal or shelf life. Since chromate conversion coatings represent a relatively new means of obtaining these finishes, this digest of facts to consider may be of value to you.

1. THE COATINGS THEMSELVES. There are many brands on the market. All are similar in many ways. Each, of course, offers its own specific advantages and these may relate to operating techniques, performance under actual use conditions, cost, availability, etc. Naturally, you'll want to choose a coating that is widely known and accepted under both military and civilian specifications.

2. THE COMPANY BEHIND THE PRODUCT. Is it a reliable, established organization? Does it offer experienced technical service, both from the field-engineering organization as well as the home office and laboratories? The man who sells and services your installation should be thoroughly familiar with not only chromate conversion coatings and their applications, but also with the characteristics and performance of related finishing operations such as precleaning, electroplating, painting, etc. This is most important since all steps of the finishing cycle must be functioning properly for the satisfactory performance of the ultimate finish produced.

3. AVAILABILITY OF THE PRODUCT. Ideally, of course, the material should be readily available to you from nearby warehouses to avoid time loss in long distance shipping and to provide emergency service, should the need arise.

4. COST. Naturally, the initial price of the material is important to you. However, just as you consider ultimate cost when you are buying mechanical equipment, ultimate cost must be considered for these finishing chemicals. So, it will pay you to investigate consumption costs, labor costs and the other factors which go into the determination of ultimate cost. Further, cost alone gives no indication of product performance, so careful attention must be given to the purpose the finish must serve and the value that finish will add to your product.

5. FACILITIES FOR RESEARCH AND DEVELOPMENT. Perhaps the existing types of chromate conversion coatings do not include a compound that will accomplish exactly what you wish. Then, it is important to deal with a supplier who has adequate research and development facilities available to work with you to produce a material to meet your needs. Naturally, such a project is seldom completed overnight. But, with complete cooperation and confidence from both you and your supplier, chances are a satisfactory program can be completed.

These are the concepts of sales and service on which we, Allied Research Products, Incorporated, have developed and marketed the line of Iridite chromate conversion coatings . . . superior product performance, complete sales and technical service, easy product availability, economical cost, extensive research and development facilities. No doubt you are familiar with our line and have seen this trademark—

IRIDITE®

—in our advertising, technical literature or on shipping containers in your plant. Remember this trademark when you're buying or investigating chromate conversion coatings for your company. It's your assurance of quality, economical products from a reliable and established company, skilled sales and technical service from both our home office and a national network of representatives, immediate availability from warehouses in strategic industrial areas and our willingness to work with you to develop new finishes to meet your needs, should the present line fall short.

For complete information on Iridite chromate conversion coatings, write today for your free copy of our technical data file. Or, for immediate advice, call in your Allied Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

ALLIED RESEARCH PRODUCTS
INCORPORATED
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Manufacturers of Iridite chromate conversion coatings for corrosion resistance, paint systems, final finishing of non-ferrous metals; ARP Plating Brightener & Chemicals. West Coast Licensee—L. H. Butcher Co.

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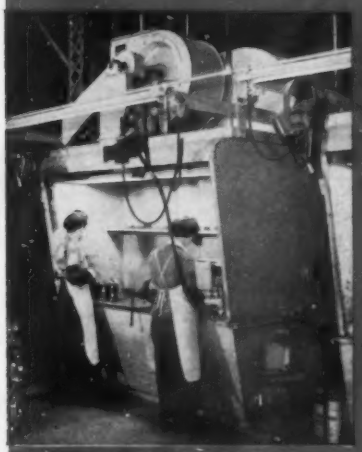
Proved Superior

for the safe collection of dust, fine chips and fumes when processing and finishing non-ferrous metals such as MAGNESIUM



PETERS-DALTON *Hydro-Whirl* WET TYPE DUST COLLECTORS

For the proper and safest method of collecting highly inflammable dusts, fine chips and grindings, the Wet Method is BEST. Peters-Dalton Hydro-Whirl Wet Type Dust Collectors are efficient in operation . . . low in price . . . and provide maximum safety to plant and personnel, particularly during what can be hazardous operations, such as grinding, polishing and buffing magnesium alloys.

Illustrated here are four types of PD Wet Type installations. *Upper left*—well ventilated bench for the safe collection of dust produced from portable tool and flexible shaft grinding, polishing and buffing; *upper right* — dust collector for grinding stands and polishing jacks; *lower left* — water-wash type spray booth for removing noxious fumes created while spraying oxidation inhibitors containing fluorides or other toxic compounds on cores; *lower right* — high velocity side hood wet collector for dust, fumes and smoke during a foundry "shakeout" operation.

Whatever your operation, PD engineers can design for you the proper type of Wet Dust Collecting Unit. We will be glad to tell you more—just write, wire or phone.

Now Available: Our informative new brochure for magnesium dust collection and control

"Wet Method is BEST"

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- Industrial Washing Equipment
- Drying and Baking Ovens
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A SUBSIDIARY OF DETROIT HARVESTER CO.
17914 Ryan Road • Detroit 12, Michigan

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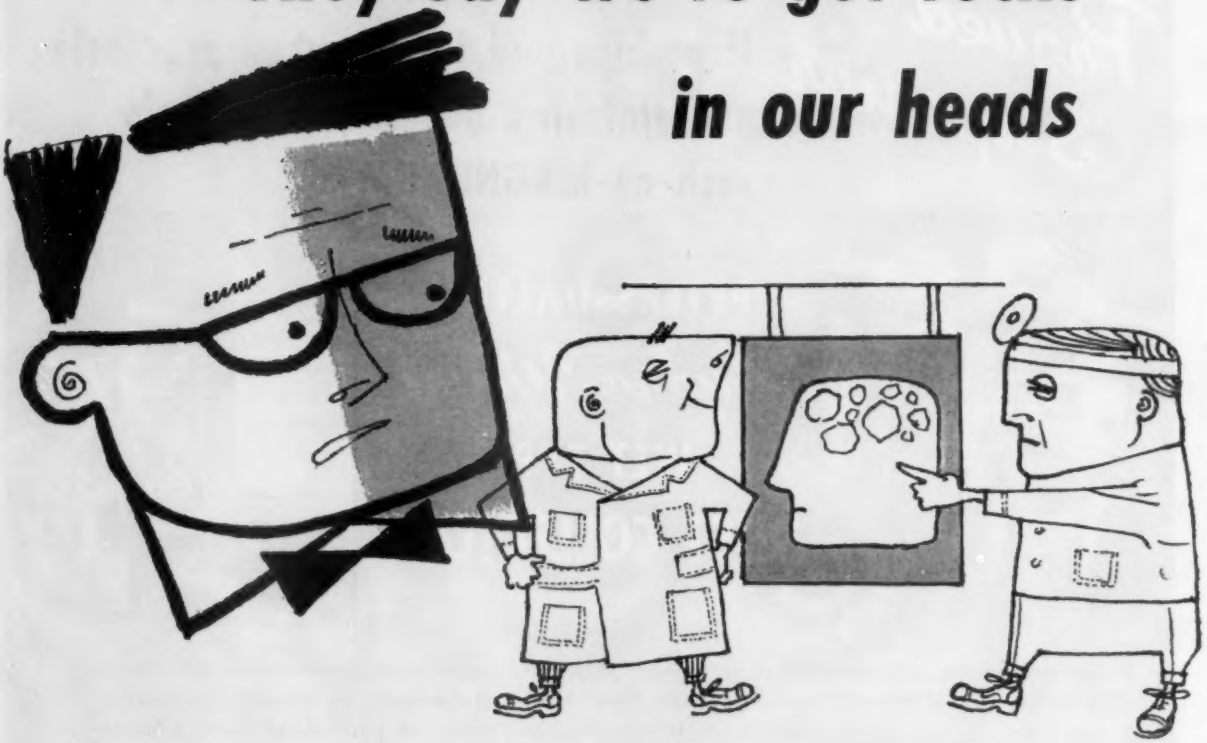
They say we've got rocks in our heads



—and it's true!

We really don't mind this sort of talk. It's our business to have the types of "rocks" on our minds that are saving millions of dollars in the finishing of manufactured parts.

Roto-Finish people have studied abrasive chips and compounds since the day they pioneered the idea of precision barrel finishing. The development of new and better media for specific finishing problems has made Roto-Finish the leader in mechanical finishing. Years of research and experience in barrel finishing techniques give Roto-Finish the "know-how" to recommend the right media to do the job you want done.

If you're not satisfied with your finishing production, look to Roto-Finish for the answer. Simply send samples of your unfinished parts, a finished part, a description of your production requirements and a list of the equipment you have available. We'll prove that you can save with Roto-Finish and we'll guarantee the same results in your plant that are achieved in sample processing.

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PLATING

continued from page 55

The copper strike, copper plate and bright nickel solutions are continuously filtered, using two industrial filters per tank. Filtration rates are 800, 8500 and 6500 gal. per hour and each tank is equipped with a heat exchanger of the same capacity as the industrial filters.

The chromium solution is not filtered, but the tank is equipped with a heat exchanger capable of cooling 4200 gal. per hour at maximum generator capacity.

Cleaner tanks are heated with plate coils. Temperatures of all cleaning and plating tanks are thermostatically controlled.

The plating racks are not separately chrome stripped prior to re-use. The first electro cleaner, in addition to cleaning, strips the racks. A chromium control agent is used in this cleaner to reduce and make ineffective the chromium dissolved.

All chromium containing wastes are segregated and treated before disposal. All other wastes are run directly to the sewer except those from the plating pit. These wastes go to a treatment tank for proper treatment before going to the sewer.

All cleaning and plating solutions are maintained in proper operating condition by continual laboratory control.

Cleaners, acids, brighteners in copper and nickel, free cyanide in the copper strike and high speed copper are checked every eight hours of plating operation.

Copper and nickel plating solutions are completely checked once each week and at this time are given a plating check using Hull cells. The chromium solution is analyzed for metal once during each 8 hour shift and twice a week for sulfate.

All production pieces are checked weekly for corrosion resistance in a standard salt spray cabinet. Metal thickness of copper and nickel is checked on the basis of production. Exterior parts are checked one part for each 4000 produced and interior parts, one part is checked for each 6000 parts produced. For a list of companies supplying equipment and supplies, see page 66.

NEW HARBISON-WALKER LABS BEGIN CONSTRUCTION

Construction of an integrated modern Research Center has begun by Harbison-Walker Refractories Company on a 21-acre suburban site south of Pittsburgh. When completed next year, the million dollar project will house all of the company's extensive research activities. Employing approximately 100, the Research Center will provide expanded facilities and staff for the study of highly refractory materials and the development of processes for converting them into industrial products.

Earl A. Garber, president, said that the company has expanded activities into new refractory product fields, such as mullite, silicon carbide and zircon, and its new facilities in several foreign countries have made available additional raw materials.

NEW 3M BRANCH OFFICE

Opening of a new branch office and warehouse here has been announced by Minnesota Mining & Manufacturing Co.

The new facilities are part of 3M's program to extend and improve service to customers in this area, according to branch office manager, R. H. Vieth.

The two-story structure has more than 47,000 square feet of floor space.

Hammond OF KALAMAZOO

REVERSING EXTRUSION FINISHER

for LOW COST, VOLUME PRODUCTION FINISHING OF EXTRUSIONS, TRIM AND MOULDINGS

The Hammond Reversing Extrusion Finisher is the modern method for finishing extrusions, trim, and mouldings.

Production is increased . . . uniform finishing is assured . . . labor costs will be reduced, when hand operated machines and methods are replaced with this modern finisher.

SEND SAMPLES and we will show you how much you can speed up production and cut costs.

Two-Head Machine shown . . . any number of heads, and length of conveyor, can be supplied to suit your job.

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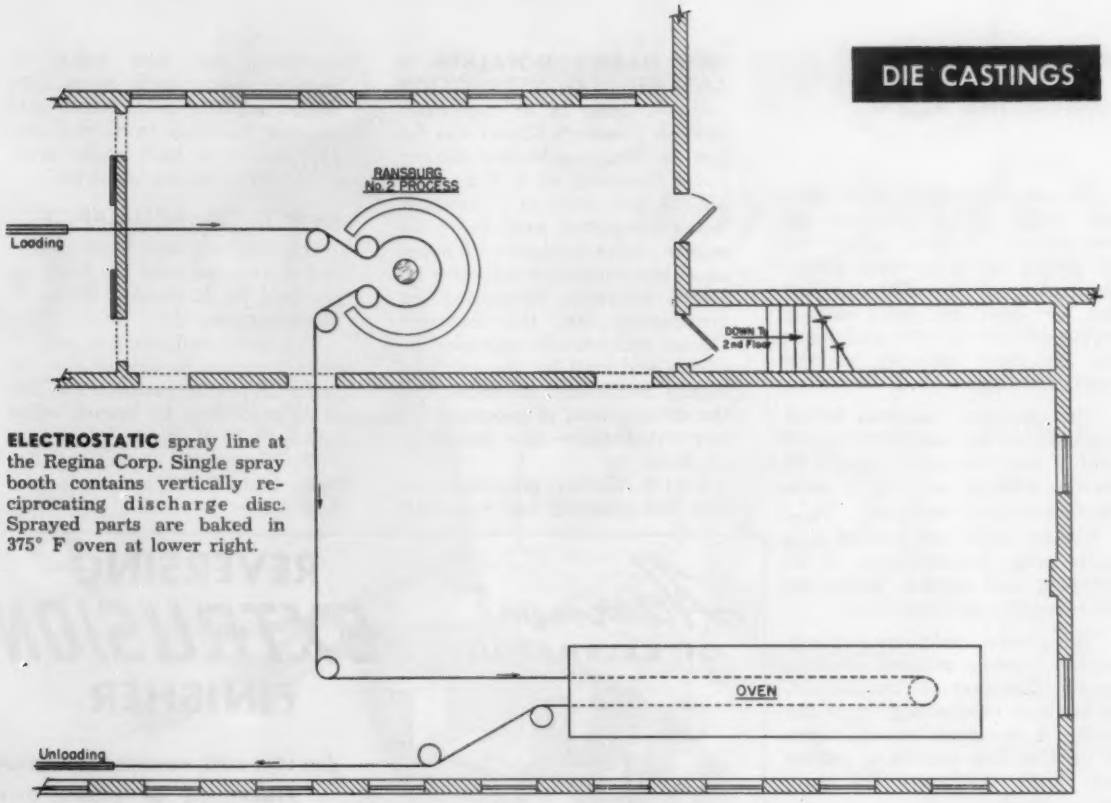
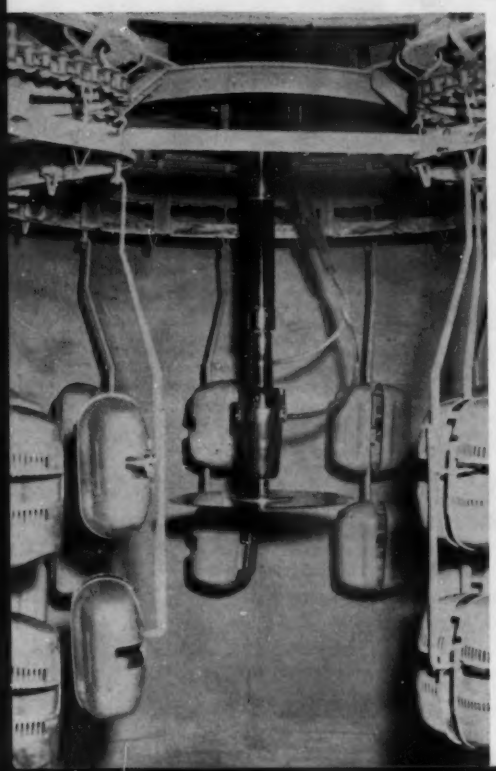


ELECTROSTATIC spray line at the Regina Corp. Single spray booth contains vertically reciprocating discharge disc. Sprayed parts are baked in 375° F oven at lower right.

How Electrostatic Spraying Cut Costs

BY JAMES CURTIN, JR.*

RECIPROCATING DISC sprays castings.



BY changing from hand spray methods to electrostatic paint spraying, we have retired seven of our eight spray booths, decreased paint consumption 50 percent, reduced maintenance and cut rejects to the vanishing point. At the same time, production was increased by 15 percent.

Cast, tubular and machined aluminum parts must all be spray painted and, to secure the wear resistance and appearance that we demand, the paint must be applied in a sufficiently heavy layer and uniformily.

When electrostatic paint spraying was first announced a few years ago, we investigated the possibility of using this system for the saving from the lessened overspray. The most troublesome part to be painted was the handle for the floor polisher and scrubber. This long, tubular piece just could not be spray painted by any of the electrostatic methods then available.

With the development of the reciprocating disc on the Ransburg No. 2 system, our interest in electrostatic paint spraying was revived.

Tests in the Ransburg laboratories demonstrated that the handles could be spray painted, automatically, and a better job would result. Further testing revealed that a system could be installed that would handle over 90 percent of the painting load.

A further advantage was that only slight changes in the conveyor system would have to be made to install the electrostatic paint spray system.

After installation of the new system we have had to use five rackers to load parts onto the conveyor and one spray system handles their entire output. Small parts, such as swivel clamps, swivels, and filter caps are racked

Continued on page 68

*Vice President The Regina Corp.

VACUUM CASTING

continued on page 40

terials utilized is manganese bronze XX. This alloy has a minimum tensile strength of 95,000 psi and a yield strength of 60,000 psi; hardness averages 190 Brinell. It has unusual wear resisting characteristics and is used where stress concentrations are high. The ductility for this material is low. It does not machine as readily as yellow brass but with the use of carbide tipped tools machining is not difficult. It has a good corrosion factor.

Aluminum bronze, another alloy available, has a tensile strength of 83,000 psi and a yield of 30,000 psi can be obtained. A higher ductility can be secured in this alloy than in the manganese bronze. It is an unusually tough alloy and has high resistance to shock and impact loading. Its resistance to corrosion is good and has excellent wearing qualities. As in the case of manganese bronze it is more readily machined with carbide tools.

One of the alloys most frequently used in the food processing industries is 22% nickel brass, commonly known as "dairy metal". Due to the smooth glossy surfaces produced by plaster mold vacuum casting methods little polishing is required from the "as cast" surfaces to finished product. When polished its finish blends well with the white surfaces of stainless steel. The dense cast structure, when highly polished, eliminates the possibility of surface porosity where bacteria might lodge. The corrosion factor of this alloy is considered excellent and its end use normally finds it in a highly polished state.

Aluminum cast by the vacuum casting methods exceeds the standard A.M.S. and A.S.T.M. specifications. The alloy produced conforms to Aeronautical Material Specification 4217B, A.S.T.M. B26-52T and also 4260B. A guaranteed minimum tensile of 36,000 lbs. per square inch with a yield of 20,000 lbs. per square inch can be obtained in test bars. It is to be remembered that these are guaranteed minimums and that the averages far exceed these properties. Castings of this material produced by the low temperature pouring methods will pass 100% X-ray examinations and also the most exacting and rigid requirements of aircraft inspection.

Beryllium copper has properties that are most unusual. It can be heat treated after casting to a tensile ranging to 165,000 lbs. per square inch with yield strengths to 145,000 lbs. per square inch. With a specific type of heat treatment its Brinnell hardness is between 400 and 440.

Industrial demand for short runs of parts in electrolytic copper has made plaster casting of this material a must. Vacuum casting techniques and the years of know-how in other alloys have produced the sound electrolytic copper castings now being poured. The smooth surfaces produced by this process have made practical the use of this copper, as-cast, in the electrical field. Guaranteed conductivity for cast electrolytic copper is 90 percent.

Practically all current parts in production are an incorporation of several parts. The economics are self-evident. Savings in weight alone on a specific part may in itself influence the selection of this process. Castings requiring thin wall sections can be uniformly produced without the usual dangers of porosity which would induce leakage and complete failure of the part either in machining or end use.

It is to avoid the costly consequences of porosity that many of these applications have been developed and are used today.

Wheels coated with ALUNDUM abrasive give housing covers a fine polish, faster and for less money — like other Norton "Touch of Gold" grains that cover the widest range of polishing operations. ▶

Setting up the wheels shown at right is an easy job. The high capillarity of ALUNDUM polishing grains improves and speeds up the wetting process with glue or cement.

How polishing costs are being cut...NOW

Trend to wheels set up with ALUNDUM abrasive is spreading the money-saving "TOUCH OF GOLD"*

Many plants where polishing jobs are important find that a change-over to wheels set up with Norton ALUNDUM abrasives results in better, faster, lower-cost polishing.

In particular, preferences for S and R type grains are increasing rapidly. The S type, available in 14 to 90 grit sizes, is specially surface-treated to give the abrasive much greater adhesion to glue or cement. The R type, made in 100 to 240 grit sizes, also gets a special surface treatment, to improve its adhesiveness for use with glue only.

Typical advantages common to all ALUNDUM polishing grains include:

- **Uniform grain shape,** that assures a fast, uniform cutting action.
- **Uniform grain sizings,** with no oversize grains that mar the finish, no undersize grains to loaf on the job.
- **High capillarity,** assuring the easy absorption of adhesive that means longer lasting, better performing set-up wheels.

The booklet "Setting Up Metal Polishing Wheels and Belts" contains valuable facts on the various types of ALUNDUM grain . . . on the applications of canvas, leather or wooden wheels . . . and on the best means of preparing wheels, with cement or glue. Ask your Norton distributor for it. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.

G-335

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ABRASIVES

Making better products... to make your products better

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A FULL LINE OF

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FOR CHROMATE TREATING

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#50: Bright, clear, lustrous, nickel-like, corrosion-resistant; requires leach.

#51: Similar to #50, but bluish chrome-like color.

#52: Low-cost, no leach, bright, passive.

CADMIUM

#50: See under Zinc, above.

#53: Improved solubility, control, safety in handling; requires leach.

COPPER & BRASS

Cobra: Bright, yellowish, decorative and/or protective film, non-fuming, single dip.

ALUMINUM

222M Sealer: Clear or colored film for corrosion protection and paint bond.

MAGNESIUM

MPD 60: Yellowish film for corrosion protection and paint base.

Data Sheets and Prices on Request. Send in part for free processing.

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THE Chemical CORPORATION

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BUYERS' GUIDE

The following firms are suppliers of equipment and supplies to the Grand Rapids Brass Co., Div. of Crampton Mfg. Co.

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Acme Mfg. Co.
The Buckingham Products Co.
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Commercial Buff Co.
Geo. R. Churchill, Inc.
A. L. Holcomb Co.
Haviland Products Co.
Walter F. Hamacher Co.
The Hakken Abrasive Co., Inc.
Hammond Machinery Co.
Klaiber Sales Co.
The Lexington Products Co.
Midwest Buff Mfg. Co.
New England Buff Co.
Progressive Engineering Co.
J. J. Siefen Co.
Grand Rapids Tumbling Supply Co.

Cleaning & Plating

The Harshaw Chemical Co.
Northwest Chemical Co.
United Chromium Div., Metal & Thermit Corp.
Wagner Bros., Inc.

Enameling & Lacquering

Binks Mfg. Co. Boydell Bros.
Crescent Bronze Powder Co.
Conforming Matrix Co.
De Vilbiss Co.
DuBois Co.
E. I. Du Pont De Nemours & Co., Inc.
Finish Engineering Co.
The Fostoria Pressed Steel Corp.
The Glidden Co., Zapon Div.
Granberg Corp.
Grand Rapids Varnish Co.
Irvin-Jewell Vinson Co.
M & E Mfg. Co.
Macbeth Arc Lamp Co.
Metals Disintegrating Co.
Peters-Dalton Co.
Red Spot Paint & Varnish Co.
Reese Sprayshield Co.
Sinclair & Valentine Co.
United States Bronze Powder Works, Inc.

ADD TO RESEARCH STAFF AT BERYLLIUM CORP.

The Beryllium Corporation today revealed the appointments of two men to the positions of Associate Directors of Research.

William H. Santschi, most recently Supervising Metallurgist at the Allegheny Ludlum Steel Corporation in Leechburg. Pa., is Associate Director of Research — Fabrication Metallurgy.

Kenneth B. Higbie, formerly Commodity Specialist for beryllium with the U.S. Bureau of Mines in Washington, D.C., is now Associate Director of Research — Process & Extractive Chemistry and Metallurgy.

6 GOOD REASONS *Why You Should Specify* MERRIMAN POWDERED METAL PARTS

1. HIGHEST QUALITY — ALL WAYS
2. GUARANTEED TO FIT
3. DIMENSIONALLY ACCURATE
4. PROVEN PERFORMANCE
5. LOW COST
6. FASTEST DELIVERY

Originators of Sintered Helical Gears High Density, precision structural parts from powdered metal in

Brass, Bronze, Copper, Nickel Silver Steel, Iron and Iron Alloys. Copper Infiltration

POWDERED METAL DIVISION

MERRIMAN BROS., INC.

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REPRESENTATIVES IN PRINCIPAL CITIES

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For more information circle No. 45 on the Reader Service Card

From this foundry comes a bulletin...

You can sell more castings

by using this low-cost deburring and polishing method!

ALMCO *barrel finishing does it!*

The casting you see above is a large aluminum wash machine agitator, produced by a busy midwest foundry.

With an Almco barrel finishing machine they *deburr and polish 48 of these castings per hour*. And the foundry's customer receives a smooth, polished casting with no rough edges, and the most beautiful high sheen you can imagine!

This is how many modern foundries are getting extra business—being able to deliver castings at an advanced stage of preparation for assembly.

The secret is Almco barrel finishing! In most cases, it is just too costly to attempt deburring, grinding, polishing, work-hardening, microinch finishing, etc., by hand methods or machining. But a particular Almco process, worked out exactly in the Almco lab, can provide these services at lowest possible cost, enabling you to offer "advance stage" castings at competitive prices.

Check into it! Write Almco, asking a sales engineer to call and arrange for detailed sample processing on your castings, without obligation. Or send sample parts direct to Almco, specifying results desired. Take action today!

SEND FOR THIS NEW BARREL FINISHING HANDBOOK

Complete description of the most advanced modern processes. 52 pages of facts, photos, data and cost comparison charts. Write for your personal copy today.

Wash machine agitators are finished by using special fixtures on the four Almco barrel doors. These hold the castings firmly while deburring and polishing action takes place. 16 agitators can be processed at once.

ALMCO

DIVISION OF QUEEN STOVE WORKS, INC.
710 Marshall Street • Albert Lea, Minn.

Sales Engineering Offices in Chicago, Detroit, Los Angeles, Newark, New Haven, Philadelphia and London, England.

For more information circle No. 73 on the Reader Service Card

MODEL "M" SERIES

Marksman tubeless electronic potentiometer strip chart RECORDER for recording and controlling such variables as temperature, speed, strain, pH and many others.

- No vacuum tubes. Sensitivity of 5 micro-volts or less.
- Potentiometer for thermocouple (TCB protected) or radiation pickup, Wheatstone bridge for resistance pickup.
- Full selection of standard scale ranges . . . 11" calibrated chart width.
- Selector knob changes chart speed . . . 5 speeds per unit without gear change.
- Single or multi-record units available.
- Equipped for 115 or 230 volts — no transformers needed.
- Additional features: Automatic standardization . . . cold junction compensation for thermocouple use . . . battery condition indicator for potentiometer . . . built-in chart saver . . . designed for standard 19" relay rack.

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NOW you can have all these practical advantages in a single instrument. Write for Bulletin M.

the trend is to **WEST**

For more information circle No. 70 on the Reader Service Card

LOREN C. HURD DIES

Dr. Loren C. Hurd, president and a director of Metals Disintegrating Co., died of a heart attack Saturday, September 28. Dr. Hurd was 52 at the time of his death.

Dr. Hurd was born in Madison, Minn., and received a bachelor's degree from Carleton College in Minnesota. He later attended the University of Wisconsin, where he was given a master's degree in 1927 and a doctorate in chemistry two years later.

Dr. Hurd taught at the Wisconsin University as assistant chemistry professor from 1925 to 1936. He received a fellowship in 1932, and studied for a year in Germany at the Hanover Tech Hochschule. From the teaching post, Dr. Hurd was employed by Rohm & Haas Co. of Philadelphia from 1936 until 1955 when he went to New Jersey to become president of the Metals Disintegrating Co. While with Rohm & Haas Co. he was research chemist and later technical director of the export department.

During World War II, Dr. Hurd served on the National Defense Research Commission, the organization that sponsored the Manhattan Project that led to the development of the atomic bomb.

Dr. Hurd was a member of the American Chemical Society, the American Electrochemical Society and the American Ceramic Society.

Electrostatic Spraying

continued from page 64

on 12 to 24 inch centers with as many as 20 parts per load. Larger parts, such as housings may be set up only four castings to a work holder.

As the parts enter the spray booth they are rotated, the discharge disc, which is 15 in. in diameter, can be set to reciprocate vertically up to 48 inches.

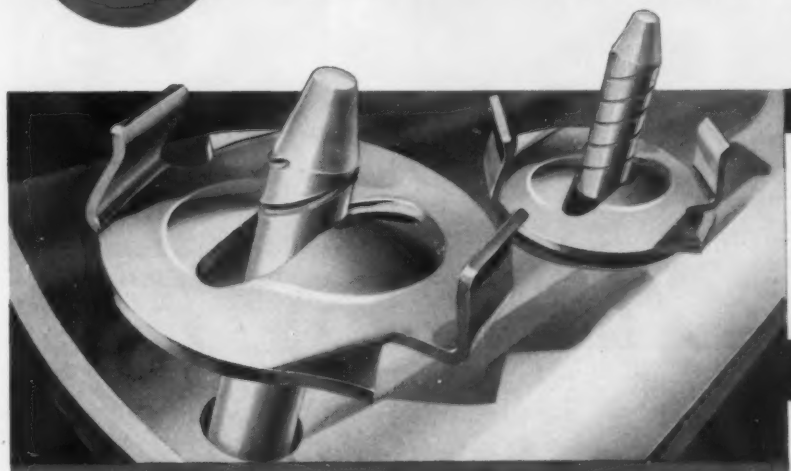
As the parts leave the spray booth they rise and travel overhead to the bake oven. The conveyor, which has an overall length of 560 ft. travels at 7 fpm. An air leg is provided between the spray booth and the baking oven to allow evaporation of excess solvent and thinner before the parts enter the oven. Baking is for eight minutes at 375F in an infra-red oven. After leaving the oven the parts continue to the unloading station.

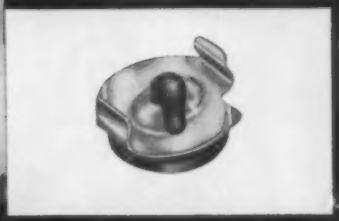
One spray man is still needed to apply reinforcement on some areas of heavy wear.

DOT THREAD CUTTING FASTENER

HOLDS TIGHT TO CURVED SURFACES

- Low Cost
- Re-Usable
- Self-Locking
- Vibration-Proof
- Spring Take-Up

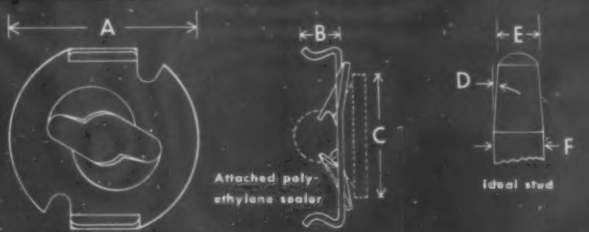




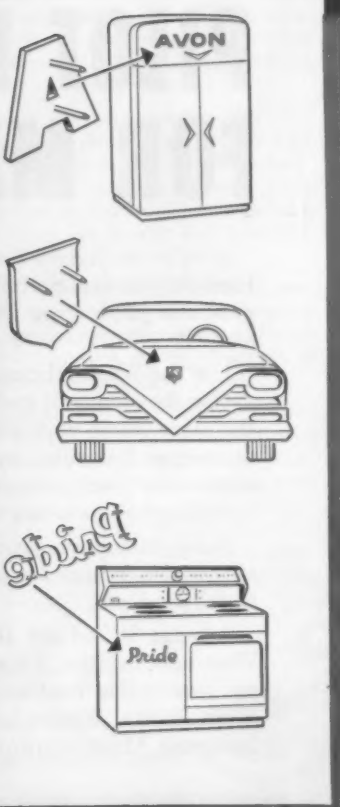
Specially designed to hold die-cast or cold-forged name plates, emblems and trim against sheet metal surfaces . . . DOT'S unique T.C.F. can be used in many other applications which require a spring take-up fastener that pulls up tight without backup on flat or contoured surfaces.

It cuts clean, deep threads on unthreaded studs, even those that are chrome plated. When used with its preassembled plastic sealer, T.C.F. makes a water-tight seal. The sealer *precedes* the fastener onto the stud so that it is not damaged by the thread-cutting process.

Available *in quantity*, with or without sealer, to fit 1/8" and 3/16" studs. Drawings available on request for magnetic tool or simple hand tool.



Nominal Sizes	A	B	C	D	E	F	Driving Torque	Ultimate Strength
1/8"	.560	.170	.450	6°/4°	.095 .085	.130 .125	7-10 Inch lbs.	200 lbs.
3/16"	.705	.200	.450	6°/3°	.160 .150	.192 .184	20-30 Inch lbs.	400 lbs.
1/4"	.875	.260	.625	6°/4°	.190 .180	.255 .245	25-30 Inch lbs.	500 lbs.



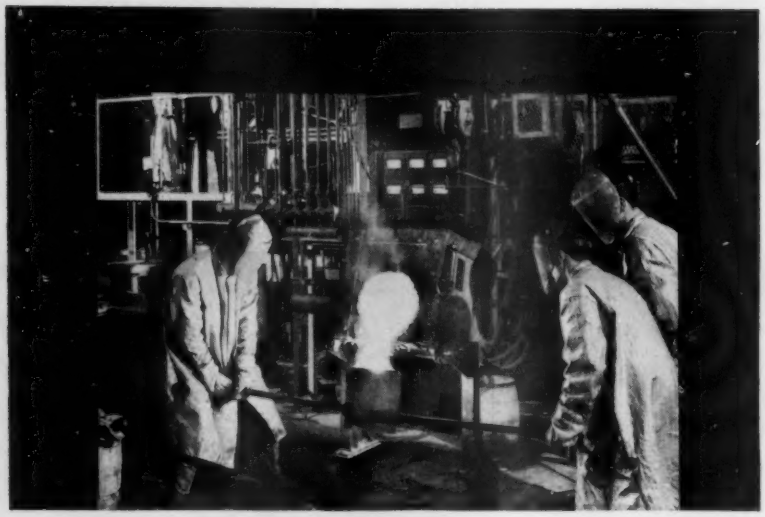
Manufactured by
MONADNOCK MILLS SUBSIDIARY
San Leandro, Cal.

DOT T.C.F.
Patent Pending

Manufactured by
CARR FASTENER CO. DIVISION
Cambridge, Mass.

UNITED-CARR FASTENER CORPORATION

For more information circle No. 84 on the Reader Service Card



At your command...

PILOT PLANT FOR METALS

How do you explore full production conditions and produce prototype quantities of castings and new alloys?

Use the Westinghouse Metals Plant. This combination development and pilot plant facility provides the place where your new metal ideas and developments can be scaled up under proved production conditions. Here you can compare various types of metallurgical processes and products.

Some production capacity can also be made available at Blairsville for fast, dependable delivery of metal products.

Arrange to see the 16-mm, full-color, 22-minute Westinghouse film, *This New World of Metals.* Also get descriptive booklet B-6570, *For a Competitive Edge.* Write Westinghouse Electric Corporation, Materials Manufacturing Dept., Blairsville, Pa.

J-05004

YOU CAN BE SURE...IF IT'S

Westinghouse

For more information circle No. 71 on the Reader Service Card

SINTERED METALS APPOINTS JAFFEE GENERAL MANAGER

Myron I. Jaffe

G. S. Gibbs, president, Sintered Metals, Inc., has announced the promotion of Myron I. Jaffe as general manager of the 15 year old powder metallurgy concern.

Jaffe holds a degree in electrical enginering from Northeastern University and a master's degree in business administration from Harvard.

At the same time, Gibbs announced the promotion of William J. Roos to chief engineer of Sintered Metals, Inc.

NEW CONSULTING SERVICE

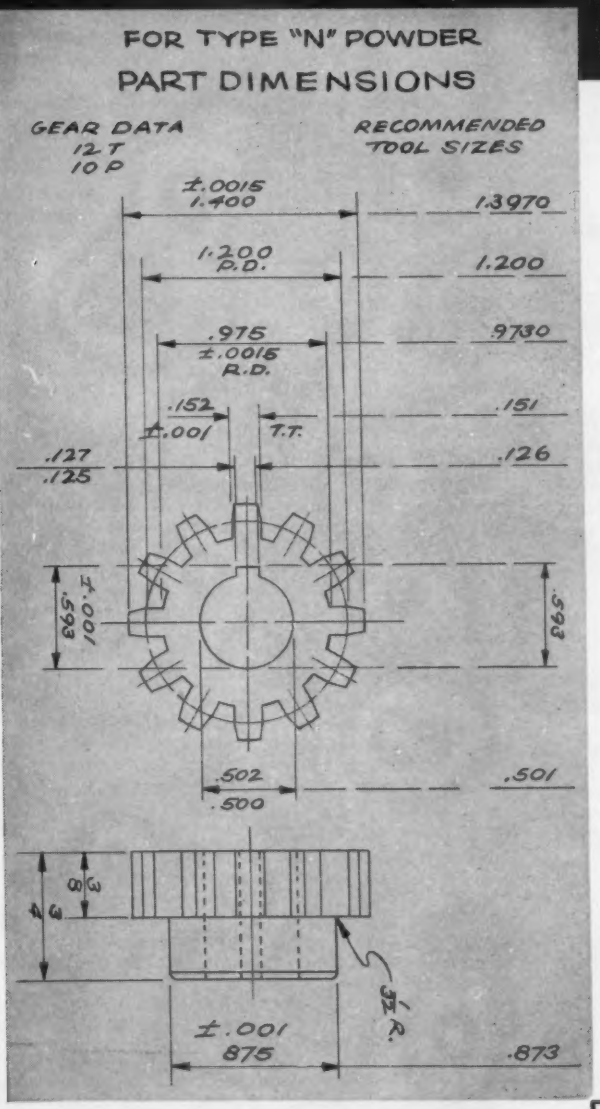
Willard F. Bub

A complete die casting consulting service is offered by Mechanical Consultants Co., Cleveland, Ohio.

Headed by Willard F. Bub, president, the new company will offer consultation over the entire field of die casting. This service will include engineering, design and redesign, estimating, die design, trim die design, and design of special tooling and fixtures.

The company will carry its complete services through machining and surface finishing.

Modernize your Tool Design with Republic cdf Iron Powders



Controlled Dimensional Factor, Republic's exclusive process for manufacturing iron powder, offers definite advantages to everyone concerned with the design and fabrication of iron powder sinterings—the tool engineer, designer, fabricator.

As indicated in the print at left, the tool engineer can now modernize his design by planning tools to part print dimensions. He is assured that tolerances, transverse to the direction of pressing, can be held within ±.001 inches per inch.

The design engineer benefits from the consistently uniform shrinkage and growth values of CDF Iron Powders. These values are predetermined. They never vary from lot to lot. They serve as a valuable aid in die design and in establishing final dimensions of parts.

The fabricator benefits from faster production, reduced costs, minimum scrap loss, savings on expensive die re-working, and production of a greater number of uniform parts per pound of powder.

Our metallurgists and engineers will help you utilize all these advantages of Republic Iron Powder with CDF. They will visit your plant, fully discuss your problems, work closely with your personnel in reaching economical and profitable solutions. This service is confidential and without obligation. Mail the coupon today.

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Company_____

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For more information circle No. 59 on the Reader Service Card

USEFUL LITERATURE, CATALOGS, MANUALS

any of these technical publications may be obtained by circling the appropriate numbers on the Reader Service Cards, Pages 48-49

PROCESSES

Investment Casting: 155

Hitchiner Mfg. Co.—This comprehensive brochure contains helpful information for the O.E.M. manufacturer interested in cutting costs or improving performance by replacing machined or assembled parts with investment castings. The process is presented with many illustrations and photographs.

Powdered Metallurgy: 156

Dixon Sintaloy Inc.—The new 12 page booklet on advanced powder metallurgy, "Precision Sintered Metal Parts," describes the advantages of Sintaloy powder metal parts. Principles of economical design and production are included with a list of characteristics of available powder metal alloys.

Vacuum Impregnation Data: 157

Western Sealant Co.—"Engineering Data on Vacuum Impregnation with PE ‡1", is the title of a six-page data sheet on a process which guarantees pressure tight castings. The technical information includes outlined and diagrammed, step by step descriptions of cycles for batch and internal pressure impregnation, including simultaneous bonding of dissimilar materials.

MATERIALS & EQUIPMENT

High Temp. Uses for Carbon & Graphite: 154

Speer Carbon Co.—Bulletin AD, "Carbon and Graphite for High Temperature Applications," includes application information, key characteristics and tabulated information on grades, sizes and properties of graphite and carbon products. The properties that make these materials useful for molds, dies, crucibles, sintering boats and similar items, subject to high temperatures, are described.

Industrial Heaters: 158

Sta-Warm Electric Co.—This bulletin features the company's line of Sta-Warm Electric Cerro Alloy Melters; for melting, maintaining or dispensing. The heaters range in size from 14 to 1600 lbs. capacity. This equipment is heated by the Sta-Warm method of applying electric heat uniformly and effectively to the outer walls and bottom area.

Organic & Inorganic Chemicals: 159

Diamond Alkali Co.—"The Story of Diamond Chemicals — Chemicals You Live By", is the title of a 32-page booklet presenting a panoramic picture of these basic materials, their principal applications, and their production. Fourteen major products or product-groups are discussed in digest form.

Special Metals and Alloys: 160

Shieldalloy Corp.—This new 22 page booklet is directed at metallurgists and design engineers who are concerned with heat resistant alloys, abrasion resistant materials, and new alloys for extremely severe processing conditions. The brochure lists complete chemical analysis, as well as powder mesh sizes for the various grades of chromium metal, chromium molybdenum, ferro alloys, tungsten melting base alloy, zirconium aluminum and vanadium aluminum.

Moisture Monitor: 161

Consolidated Electrodynamics Corp.—Bulletin 1834A presents technical data on a portable, low-cost, dependable instrument which measures accurately minute quantities of moisture in gaseous mixtures down to less than one part per million.

Protective Atmosphere Equipment: 162

C. I. Hayes, Inc.—Bulletin 256 describes Ammonia Dissociators, for rated capacities up to 5000 CFH, which produce comparatively inexpensive hydrogen-nitrogen atmospheres of extreme purity (99.96% dissociation) and very low dew points.

Radiation Digest: 163

X-Ray Dept., General Electric Co.—The latest issue of this digest contains the following informative articles: "X-Ray Analytical Techniques in Pulp and Paper Research", "CAA Inspectors Study New X-Ray Developments", "Criteria for Selection of X-Ray Equipment", "Simplified Computer Aids Crystal Structure Analysis", and "Recent Developments in X-Ray Microscopy."

Environmental Testing: 164

Associated Testing Laboratories, Inc.—The company's facilities, for testing electronic, electrical, electromechanical and mechanical components, products and systems with high speed service and accuracy, are presented in this new illustrated brochure.

New Heating Element: 165

Globar Division, The Carborundum Co.—Technical Bulletin H announces a new and improved silicon carbide heating element. The new element builds up resistance at a very gradual and uniform rate, which results in longer element service, lower replacement costs, more uniform product quality and greater continuity of production.

High-Temperature Alloy: 166

Haynes Stellite Co., A Division of UCC.—The latest properties information on Multimet alloy is available in this 24 page booklet. Contents include such properties information as stress-rupture strength, short-time tensile data, and fatigue and creep data.

Automatic Lubricator: 167

Westbrook Mfg. Co.—The Dorsey automatic piston and cylinder lubricator, for aluminum cold chamber die casting machines, features efficiency and savings. An illustrated folder presents technical data on how the lubricator permits precise control of the amount of lubricant used, and how the correct amount of lubricant is introduced at every cycle.

Continued on page 75

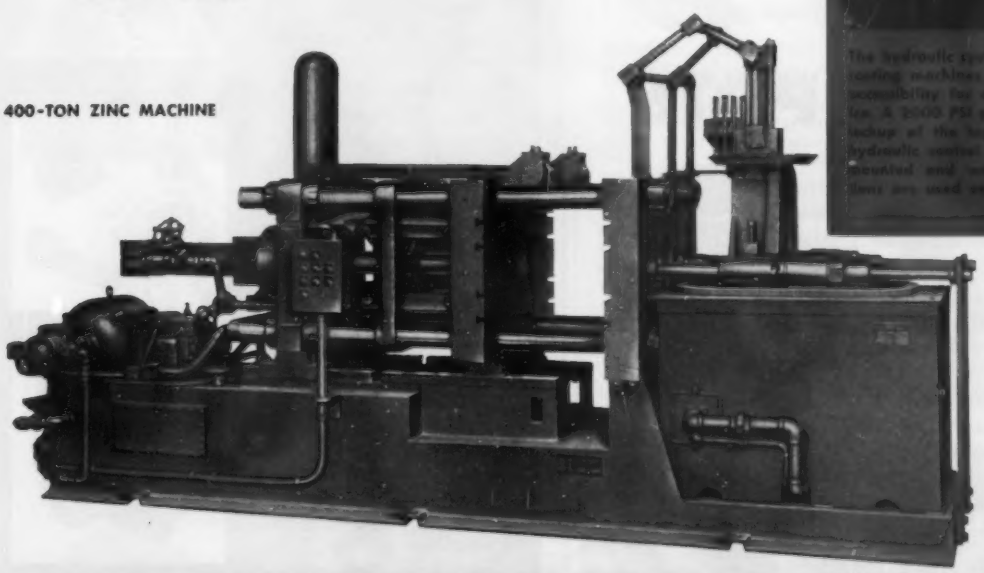
Your Good Judgment is Confirmed When You Buy . . .

B&T DIE CASTING MACHINES

In many industrial centers you'll find leading die casters using B&T die casting machines — purchased by smart production men who, having carefully investigated and compared, choose them in preference to all others. These men know that for castings of extreme accuracy, excellent density and finish, B&T Die Casting Machines can not be beat. And, furthermore, that they'll give you top production with a minimum of maintenance.

13 MODELS thoroughly proved by many years of actual service — ranging in capacity from 100 to 750 tons — for zinc, aluminum and brass. EACH DESIGNED AND BUILT TO THE SPECIFICATIONS OF PRACTICAL DIE CASTERS AND DEVELOPERS OF DIE CASTING MACHINES WITH OVER 35 YEARS OF EXPERIENCE.

400-TON ZINC MACHINE



Write FOR BULLETINS GIVING DETAILED INFORMATION

B&T MACHINERY COMPANY 931-317 EIGHTH ST. HOLLAND, MICHIGAN PHONE 2341

BUSS

AN AFFILIATE OF BUSS MACHINE WORKS • MANUFACTURERS OF MACHINERY SINCE 1862

Represented in Canada by Upton Braedeen & James, Ltd.

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Close-Grained for Longer Life

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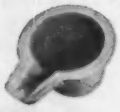
REFAX® POTS



Careful metallurgical control makes low alloy nickel-chromium cast iron *Refax® Pots* extra tough and durable. Close grain adds strength without brittleness. Tapered design allows quick heat absorption without swelling or distortion. Send for detailed bulletin covering superior quality acf Refax Pots, Refax Utility Castings, Goosenecks and Ingot Molds. Write Dept. 10-I, American Car and Foundry Division, acf Industries, Incorporated, 30 Church St., New York 8, N.Y.

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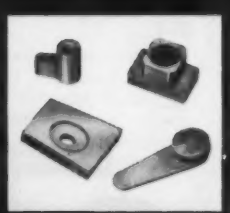
For more information circle No. 3 on the Reader Service Card

JELRUS for COMPLEX Investment Castings

BUT SAVINGS CAN BE MADE ON SIMPLE PARTS, TOO.

JELRUS produces the most complex investment castings in a wide variety of ferrous and non-ferrous alloys. BUT, never assume that only complex parts make economical investment casting applications. Time and again we've shown how to save money by using JELRUS investment castings in relatively simple shapes. Prices for parts in the simple shapes shown range from only 20 to 60 cents. That's why it pays to consider JELRUS Investment Castings wherever multiple milling operations are required. Let our engineers help you to re-evaluate your machined parts as investment castings.



We'll be glad to quote promptly, from your parts or blueprints, or request a visit from our local representative.

Write for Free Manual on JELRUS Investment Castings.

JELRUS PRECISION CASTING CORP. 615 WEST 131st STREET NEW YORK 27, N. Y.

For more information circle No. 42 on the Reader Service Card

USEFUL LITERATURE

continued from page 72

FINISHING

Composition for Reverse Current Cleaning: 173
Oakite Products, Inc.—Information is available on Oakite Composition No. 90 for reverse current cleaning of steel before plating. The composition combines the properties desirable in a reverse current cleaner: high conductivity, superior smut removal, controlled foaming, and long life in solution.

Metal Finishing Regulator: 174
Robertshaw-Fulton Controls Co.—A new self-operated temperature regulator, for use exclusively in metal finishing processes, is described in an illustrated brochure which contains application data and diagrams of typical installations. The control will provide accurate temperature regulation in plating, bonderizing, anodizing, cleaning, pickling and rinsing solutions.

Metallic Impregnation Sealant: 175
Imprex Div., Ideal Industries—Metallic 909 Sealant, for impregnation of porous castings, is described in an eight page brochure. The sealant contains the additive "I-X", which creates a suspension factor that prevents a fallout of solids.

Burnishing Compound: 176
Oakite Products, Inc.—Oakite FM 103, a special compound designed to improve brightness of work, is described in report B-6644. The compound develops exceptional color and luster on brass, copper, nickel-silver, gold, and mild and hardened steel parts.

Stop Aluminum Corrosion!
Insure Paint Adhesion
Provide Ornamental Finish

TURCOAT 4178
(Aluminum Surface Conversion Coating)
DOES ALL THREE!

Immediately non-smearing

Easy to Control

Meets Government Specification MIL-C-5541

Easy to Use

Write for full descriptive and technical details . . . FREE!
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Chemical Processing Compounds
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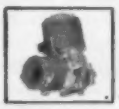
Offices in all Principal Cities
Manufactured in Canada by B. W. Deane & Co., Montreal

For more information circle No. 83 on the Reader Service Card

What are your zinc or aluminum die casting needs...

ADVANCE know-how in Zinc and Aluminum die casting design, engineering and production covers a wide range of component part needs from small camera parts. . .



. . . to engine cylinders

Moreover, ADVANCE often solves a product sales problem by alert die casting engineering and skills which smooth-up product lines and appearance while at the same time improving casting cycles and lowering part costs.

That is why ADVANCE Zinc and Aluminum die cast parts are important components everywhere in home appliances, office equipment, power tools, gas engines, cameras, surveyors' instruments, electric motors and control devices.

Consult ADVANCE about your die cast parts problems ...and write for folder "YOUR DOORWAY to Certified Zinc and Precision Aluminum Die Castings."

These symbols are your assurance of highest quality control of zinc and aluminum alloys under ASTM standards

37 years of service to industry

ADVANCE TOOL AND DIE CASTING CO.
3760 N. Holton St.
Milwaukee 12, Wis.

For more information circle No. 5 on the Reader Service Card

NEW PRODUCTS AND DEVELOPMENTS

Want complete details on these announcements? Use the Reader Service Cards. You'll find them facing page 48 of this issue

NEW POLISHING AND GRINDING WHEELS ARE STRONGER, MORE VERSATILE

Disposable flanges and a design that permits flush sanding are the two major improvements in its line of small coated abrasive polishing and grinding wheels for finishing and maintenance operations, according to Minnesota Mining & Manufacturing Co.

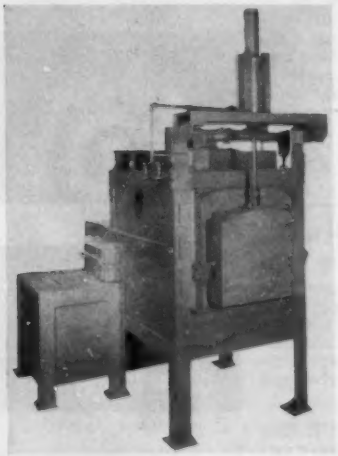
The new disposable flanges, which lock the wheel's coated abrasive leaves securely in place, are factory-installed and bonded to the core. This type of construction makes it unnecessary to remove the flanges when a wheel change is required; it's simply a matter of slipping the wheel on the spindle and tightening the cap nut. The improved design does not change the performance characteristics of the wheel.

Specifications include a standard 1" center hole on wheels 6" in diameter; and a standard 1¾" center hole on wheels with a 7", 8", 9" or 10" diameter.

Three adapter kits make it possible to fit the wheels onto any portable tool or bench lathe.

Circle No. 205 on Reader Service Card

NEW TOP-FIRED, ALUMINUM-MELTING FURNACES ARE ANNOUNCED



A new line of double-chamber, dry-hearth, reverberatory-type, aluminum-melting furnaces have been announced. These furnaces are available for gas, oil, or combination firing. The burners are mounted in the arch or roof for firing down into both melting and holding chambers, providing extremely rapid melt-down of aluminum for die-casting, permanent mold, and sand casting work.

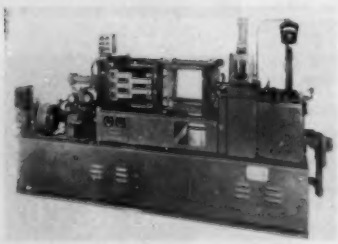
High melting rates and uniform pouring temperatures are among the user benefits in this new line from the Industrial Furnace Division, Eclipse Fuel Engineering Co. Because of these factors, production per square foot of floor space is 50% higher than with comparable size crucible furnaces and fuel consumption is about 40% lower.

Because the new aluminum furnaces can be provided with end, single-side or double-side dipouts, they fit perfectly into a variety of production lines. Hourly capacities range from 300 to 2000 lb.

The design eliminates gas pick-up and oxide inclusions, holding scrap loss to an absolute minimum. Accurate control of the dip-out temperature, eliminates scrap from metal being poured at the wrong temperature.

Circle No. 206 on Reader Service Card

LOW COST DIE CASTING MACHINE HANDLES UP TO 4 LB. SHOT AT HIGH SPEED



A new, low cost, high speed die casting machine that will handle shot capacities up to 4 lbs., with all the features and workmanship of larger and costlier machines, is announced by the American Die Casting Machinery Co.

The new machine features an all steel welded construction, solid block steel toggles and 150 ton locking pressure. Other features are: Automatic electric cycling at high speed (up to 500 shots per hour); 20" x 21" die platens; 8" die stroke; Blast type furnace blower; Moving platens supported by bronze carrier shoes; Highest grade controls and valves.

The machine is available in two models. Model 150Z hydraulically operated plunger goose neck type for zinc, tin and lead. Model 150A cold chamber type for aluminum, brass and magnesium. Standard or fire-resistant fluids may be used in the hydraulic unit.

Circle No. 207 on Reader Service Card

You get speedier service from the

ZINC ZONE

Central location of American Zinc plants assures prompt deliveries of slab zinc to any point in the nation.

HILLSBORO, ILL., PLANT
Prime Western, Brass Special, Intermediate, High Grade, Continuous Galvanizing Grades
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Special High Grade, High Grade, Continuous Galvanizing Grades, Special Shapes
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Prime Western, Brass Special, Continuous Galvanizing Grades

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CRUSHED STONE

American Zinc Sales Company

Distributors for AMERICAN ZINC, LEAD & SMELTING COMPANY

Columbus, Ohio • Chicago • St. Louis • New York • Detroit • Pittsburgh

For more information circle No. 7 on the Reader Service Card

Process observation, alloy additions, pouring, temperature and pressure readings, high frequency control, valve sequencing—all focus around one center of operation.

Small but versatile

a high-vacuum furnace for lab and pilot plant

CEC's 5 to 50 pound melting and casting furnace offers:

Three-way casting: Melts of 5, 12, 17, 30, or 50 pounds can be cast in single or multiple molds—or centrifugally.

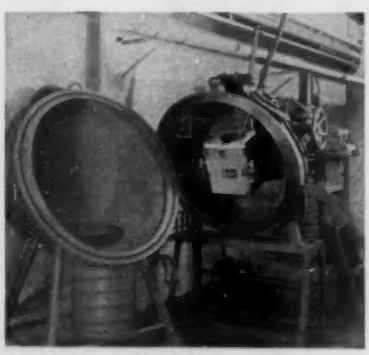
Ease of materials handling: All parts of the furnace interior are within arm's reach. The oblique angle flange connecting the chamber sections provides unusual vertical clearance for removing molds directly with a crane. A deep mold well provides 33″ under the crucible lip for pouring bar-type ingots.

Complete controls: A manual bridge-breaker assembly is combined with a water-cooled, nonfogging sight tube for optical pyrometry. A sampling device and a thermocouple assembly are standard accessories. Interlocking of the pneumatic vacuum line valves makes for safe and proper cycling.

The mold well is water-cooled. Electric feedthroughs are provided for mold heating.

Ample pumping: A 2-stage diffusion-ejector pump brings the system swiftly to the low micron Hg pressure range, with plenty of reserve capacity for pressure surges from alloy additions, deoxidation, and pouring.

Write for illustrated bulletin No. 4-30 that lists complete specifications, accessories, and design features of this remarkably versatile furnace.



Open furnace shows crucible and coil assembly. Mold chamber has deep well and (optional) indexed table for multiple molds.

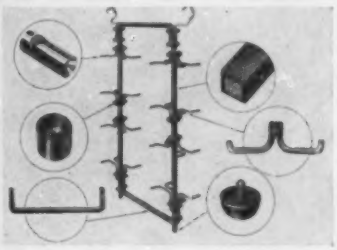
Consolidated Electrodynamics
Rochester Division, Rochester 3, N. Y.
formerly Consolidated Vacuum

For more information circle No. 20 on the Reader Service Card

NEW PRODUCTS—
continued from page 76

NEW PLATING RACKS . . . answer demands of plating industry

Versatility, simplicity, durability and long life are just a few of the many features incorporated into the basic design of this new type rack. The result helps the user to reduce metal build-up



on racks, drag-out losses, drag-in solution contamination, high maintenance and product rejects.

Design provides for direct current conduction from the hook to the piece-holding member without resistance joints. The rubber-to-rubber joints of the assembled rack are sealed with two ribs, one concentric to the other.

The splines and other components of this new unit, manufactured by Automotive Rubber Co., Inc., are completely covered prior to assembly with a newly developed, molded thermosetting compound.

Circle No. 214 on Reader Service Card

TORCH FILTER . . . for liquid or gaseous fuels

A new design torch filter, for either liquid or gaseous fuels, is equally effective when used with welding, brazing or cutting torches. Designed by Gibbs, Ltd., the Permetal No-Flash filter design prevents particles, as small as 0.001″, from entering the torch. The filter also prevents flashback from passing through the filter to the hose lines.

The filter has a rugged one-piece body, with a one-piece inner core (the filter) made of Permetal. The unit is installed between torch and hose lines without adapters.

Circle No. 208 on Reader Service Card

PROTECTION AGAINST LIQUID ALUMINUM . . . is now possible

The protection of steel and cast iron parts against attack by liquid aluminum, is possible with a new

process. Called "Borocote", the the process uses chromium boride rods, and flame-sprays them in a new type of metal-spraying equipment. The surface coating will prevent wetting of the coated steel or iron by molten aluminum. The coating has oxidation resistance up to 1800 F.

Applications would include protection of thermocouple tubes, parts to be inserted in molten aluminum, heat exchangers, and other applications in aluminum casting equipment.

Circle No. 209 on Reader Service Card

PLATING AND ANODIZING MACHINE

. . . is fully automatic

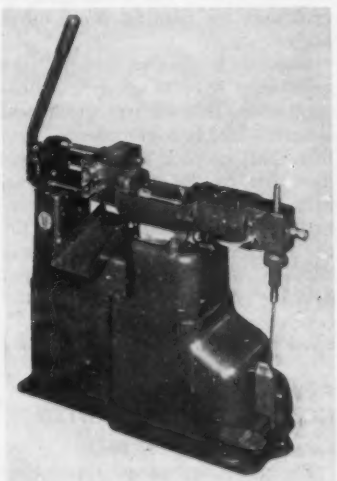
Called the "Cycleflex," the new machine, which requires one man operation, can produce up to 240 racks per hour when arranged with a double-lane plating or anodizing unit. Operation of this machine, from Lasalco, Inc., is from a single control panel. The machine can be adapted for automatic loading and unloading of racks with a conveyor.

Circle No. 210 on Reader Service Card

NEW DIE CASTING MACHINE

. . . for casting small rotors

A small, aluminum cold chamber die casting machine has been introduced that is especially adapted for casting aluminum al-



loys around any small rotor for electric motors. Manufactured by British Machines & Foundry Supplies Ltd., the machine has a capacity of 2½ oz. per shot, and will cast up to 200 rotors per hour.

The DCMT "Rotorcaster" has an air-operated "Impact" type injection system.

Circle No. 217 on Reader Service Card

YOUR GUIDE TO BETTER DIE CASTINGS

—How to design for CHROME-PLATED DIE CASTINGS

Chromium plating of zinc die castings is often the ideal solution for improved appearance and superior resistance to corrosion and wear. Chromium is applied on top of copper plus nickel, depending on the coating thickness required and the need for corrosion resistance.

Plating Thickness: Type of service determines thickness of plating. Thinnest coatings for decorative plating, heavy deposits for wear resistance. Copper undercoating should be at least 0.00020 in.; nickel a minimum of 0.00050 for outdoor service and 0.00030 for all other service. Minimum chromium thickness should be 0.000010 in. Specify heavier coatings for severe corrosive or abrasive service.

Part Preparation: For effective durable chromium plating, parts should be free of sponginess, die markings, casting defects such as cold shuts and pinholes. Die casting based on sound design will lower costs for preparation of parts for plating.

Section Thickness: Heavy sections, thick pads or bosses can cause surface shrinks that may impair the plated finish or add to preparation cost. Thin uniform sections are better, provided thickness is heavy enough to insure smooth, even surface. Minimum wall thicknesses for zinc—0.030 in. average, 0.060 in. for larger parts; for aluminum —0.050 in. and 0.080 in.

Surfaces: Large, flat surfaces exaggerate small imperfections—some degree of crowning aids good die casting and results in better appearance. Introducing a slight pattern, raised beads, shallow ribbing or other serrated design is desirable where they will not interfere with casting and buffing.

Fillets and Corners: Generous radii and fillets should be used where possible. Rounded surfaces can be cast stronger and are easier to clean, buff and finish. Avoid sharp edges and projections. Sharp inside corners are difficult to polish. Small fillets at strengthening ribs promote good plating. Minimum fillet size—0.060 in.; outside radii not less than 0.015 in.

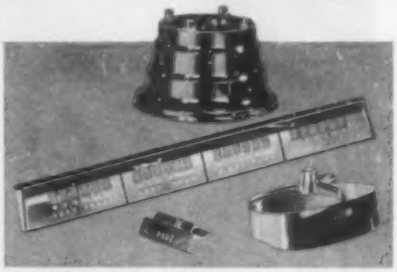


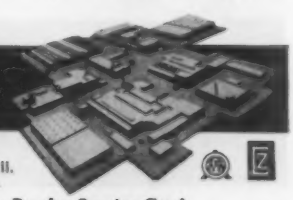
Fig. 1 — Thin walls obtained by coring out heavy sections give sounder surfaces as a base for plating.

Fig. 2 — Even a slight "crowning" of flat surfaces improves appearance, facilitates polishing and plating, and cuts down rejection rate.

Parting Lines: Consider flash removal when designing parting lines. Minor design changes in the part may avoid special trimming equipment. Transferring parting lines from one surface to another can simplify trimming, buffing and finishing. Beading the parting line will reduce finishing costs by simplifying flash removal—and can also serve to blend slight mismatching of parts.

Other Decorative Platings: Brass may be substituted for chromium on the last stage of the plating process. Silver, gold or other metals can be plated on zinc after pre-plating with copper and nickel. Black coatings can be produced on zinc by electrochemical methods.

Let Precision engineers show you many economical ways to die-cast and plate durable, attractive products.



PRECISION CASTINGS CO.
DIVISION OF HARSCO CORPORATION

Central Sales Office: Fayetteville, N. Y.
Fayetteville, N. Y. — Syracuse, N. Y. — Cortland, N. Y. — Chicago, Ill.
Cleveland, Ohio — Kalamazoo, Mich. — Detroit, Mich. — Rockford, Ill.

For more information circle No. 56 on the Reader Service Card

1
2
3
Recessed lettering on this oven control (1) requires raised letters in the cavity. Yet, from one master hob (2), you get multiple molds or dies with raised lettering (3), in any quantity, with a minimum of machining, filing and polishing.

Raised Lettering in Your Molds . . . Easy and Economical with

NEWARK DIE HOBBED CAVITIES

For lower tool costs and faster production . . . especially with multiple molds of complicated design . . . die hobbing is the method to choose. Because every cavity is cold pressed in steel from the same master, lettering and design details are always uniform. The high hobbing pressures (up to 100 tons per sq. in.) also cause the steel to flow and condense alternately, resulting in a closer surface grain structure. This provides an exceptionally long lasting luster . . . insures maximum fidelity of reproduction in the final product.

Now Producing Cast Cavities by the Shaw Process

WRITE for your free copy of "How and When to Hob." Or let us discuss directly how Newark's complete die hobbing facilities and experience with all sizes and types of cavities may benefit you. No obligation, of course.

NEWARK DIE HOBBING AND CASTING CO.

20 SCOTE STREET, NEWARK 2, N. J. PHONE MArket 2-3305

HIGH-VACUUM PUMP . . . has three times better ion pumping speed

Greater ion pumping speed and dependability are the main features of the new model Evapor-Ion Pump, Type EI-2000A. The pump provides an electronic method for producing high vacuum without the use of organic pump fluids.

The pump, manufactured by Consolidated Electrodynamics Corp., creates a "dry" vacuum in the range from 10^{-4} to 10^{-8} mm Hg. Active gases are pumped by the gettering action of evaporated titanium wire. Inert gases are pumped by ionizing and burying them under a layer of titanium. The pump has a pumping speed of 1900 liters per second for nitrogen, 1000 liters per second for oxygen, and 3000 liters per second for hydrogen.

Circle No. 211 on Reader Service Card

ELECTRIC HEATING UNITS . . . feature new design

"Adaptatherm" electric heating units and heaters, manufactured by H. W. Tuttle & Co., boast a new method of construction. It consists of embedding specially insulated resistance wire in the body of a solid casting, made of a heat conducting material such as aluminum alloy. The embedding material may form the body to be heated itself — or form an integral unit for heating some other body.

Special insulation around the resistance wire is used as a heat conductor. This assures rapid heat transfer and it is completely flexible. This method minimizes heat loss due to air convection, permits lower operating temperatures in the resistance wire for the required heat densities at the surface, and provides increased heating efficiency and life in the heating units.

Circle No. 212 on Reader Service Card

PRECIOUS METALS CAN NOW BE ELECTROPLATED . . . at new low cost

Electroplating of gold and rhodium is now possible at low cost with the development of the Bright Plating Process. Developed by Sel-Rex Corporation, Sel-Rex Bright Gold plates mirror-bright directly from the bath — regardless of thickness requirements, eliminating scratch brushing or burnishing. It is reported that one gram of the new Bright

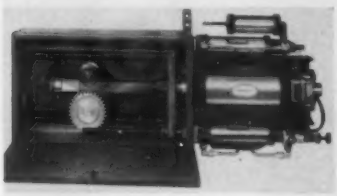
Gold will do the work of two grams of conventional 24K Gold in specification plating.

Circle No. 213 on Reader Service Card

POWER FEED UNIT

. . . for many multiple drilling applications

"Hy-Torque" is a complete heavy duty unit designed primarily to power the feed on multiple drilling applications. The basic unit consists of a steel gear rack which drives a pinion gear



mounted on a shaft with a hub as the drive unit. The 3000 inch pounds maximum torque delivered at the hub may be applied to any cross-feed shaft or driven shaft for rotational or linear movement.

The Bellows Co., manufactures four standard models which provide a choice of degree of rotation on the 4" pitch diameter pinion gear: 170, 255, 340, or 425 degrees. The units will operate on any air pressure between 15 lbs. and 150 lbs., and are available for line or low voltage operation.

Circle No. 219 on Reader Service Card

HARDNESS TESTERS

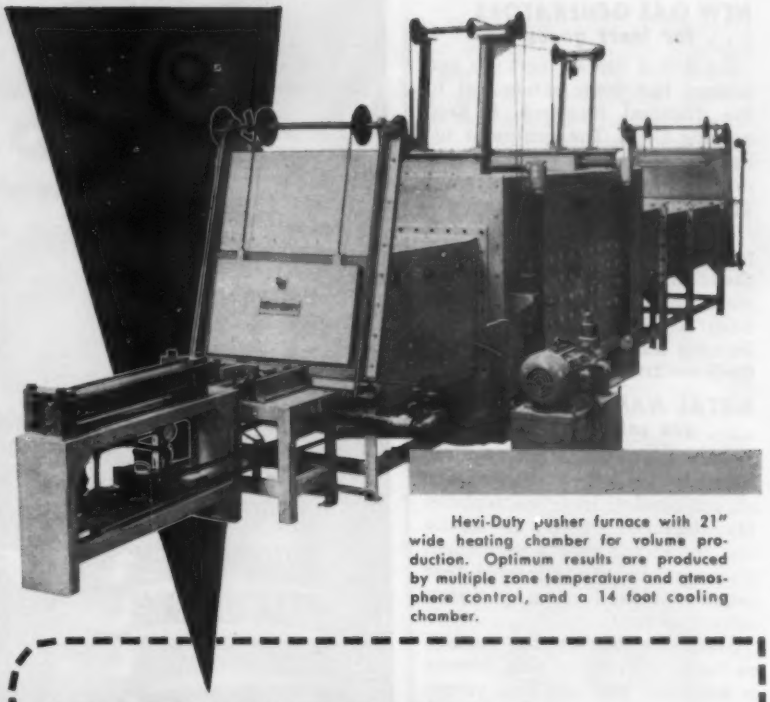
. . . to be displayed at National Metal Show

The latest hardness testing devices currently available will be demonstrated and displayed at the National Metal Show. Many of these testers operate on the "Reflex" principle. They include a specially developed optical system, which produces and automatically projects a greatly magnified image of the special test indentation.

On display by Gries Industries, will be one Reflex model which includes push-button control of loads from 1 kg to 120 kg (or to 250 kg, if desired).

The motorized Reflex 3000 kg Brinell hardness tester, is used for rapid, routine checks. Diameter of the ball impression is projected on a screen. Information on these and other models in the series is available.

Circle No. 220 on Reader Service Card



Hevi-Duty pusher furnace with 21" wide heating chamber for volume production. Optimum results are produced by multiple zone temperature and atmosphere control, and a 14 foot cooling chamber.

HEVI-DUTY

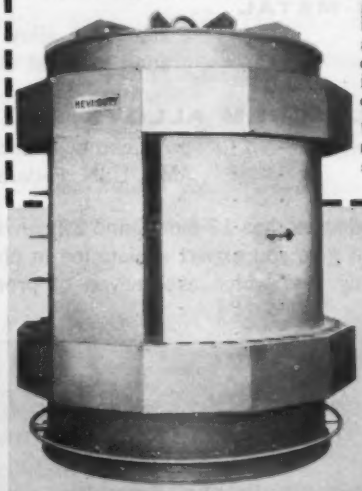
FURNACES FOR SINTERING under a Controlled Atmosphere or Vacuum

CONTINUOUS PRODUCTION FURNACES — Your production sintering requirements can be met by Hevi-Duty pusher or conveyor furnaces; temperatures to 2500°F. Multiple zone temperature control and a variable speed drive will insure uniformly perfect sintered compacts. High temperature electric heating elements reach desired operating temperatures rapidly.

Hevi-Duty exothermic or endothermic atmosphere generators provide the range of gases necessary for sintering.

VACUUM FURNACES — Hevi-Duty pit or bell type double pump vacuum furnaces provide temperatures to 2100°F. Vacuum sintered parts show greater homogeneity and density, and better ductility than those conventionally sintered. This method is often less expensive and the elimination of gas inclusions reduces mechanical or physical defects.

Write for Bulletins 357 and 557 to determine the Hevi-Duty furnace best suited for your sintering requirements.



Hevi-Duty bell type double pump vacuum furnace for sintering at 2100°F. Standard pit or bell type vacuum furnaces are available with uniform working zones up to 54" in diameter by 144" high.

HEVI-DUTY ELECTRIC COMPANY

MILWAUKEE 1, WISCONSIN

Heat Treating Furnaces... Electric Exclusively

Dry Type Transformers *Constant Current Regulators*

For more information circle No. 40 on the Reader Service Card

NEW GAS GENERATORS . . . for inert gases

The Sub-X line of inert gas generators has been announced by the Thermal Research & Engineering Corp. The generator utilizes direct contact cooling of the products of combustion from a Thermal high velocity burner.

The generator can be used to provide inert gases for refineries, chemical, metallurgical plants and many other industrial installations. A wide range of gas or oil burning models are available.

Circle No 215 on Reader Service Card

METAL NAMEPLATES . . . are self-bonding

Only ten seconds are required to apply these new deep-anodized, self-bonding metal nameplates. Manufactured by W. H. Brady Co., the plates have a permanent pressure sensitive adhesive that requires no activation by water, solvent or heat.

Since the nameplates require no holes to drill, no pins, screws or fasteners, they are time savers on the production line. Typical uses are: identification, instruction, information, trademarks, insignia, warranties, diagrams, etc.

Circle No. 216 on Reader Service Card

MUSHROOM DISCS & PADS . . . improve contour polishing on radii

A new mushroom shaped molded rubber pad and coated abrasive has been developed for contour grinding or polishing in small radii or difficult contours with protable tools.

Developed by Behr-Manning Co., the pads were especially designed for getting into contours where conventional disc pads can not perform effectively. With the pad it is possible to do an entire contour in one operation. The new pads virtually eliminate swirl marks and gouges.

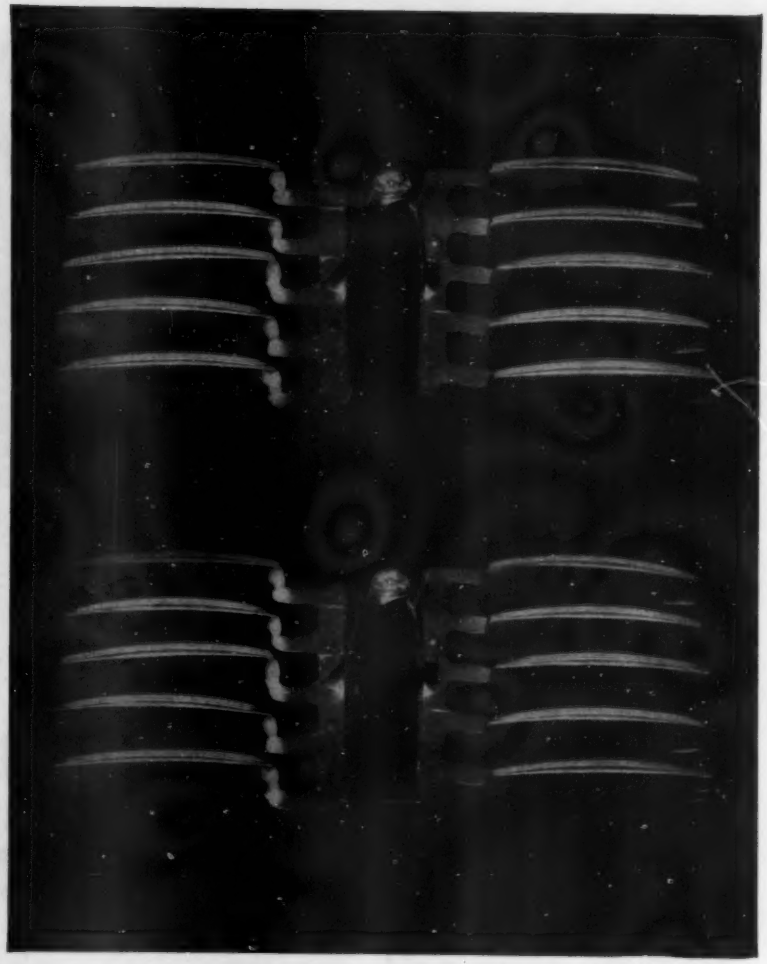
The pads and discs are currently available in diameters of 5 and 8 in.

Circle No. 218 on Reader Service Card

BENCH IS FOR PORTABLE INSPECTION . . . takes gages to the job

Necessary gage blocks and accessories for checking the various type gages in use can be carried, along with spare gages to replace worn units, in a new inspection bench, right to the job.

Developed by the Wright Tool Co., this convenient mobile system serves to reduce the inventory of expensive gages and elim-



FEDERATED ALLOYS FOR THE DIE CASTING INDUSTRY

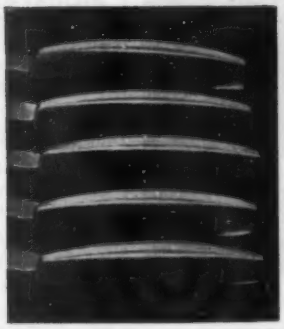
DI-METAL . . . a zinc base alloy of high purity, produced in three grades to meet all required mechanical properties.

ALUMINUM ALLOYS . . . produced by Federated to conform to the ASTM, SAE, AMS, USN, Federal and AMS specifications.

Federated has 12 plants and 22 conveniently located sales offices which can give you expert assistance in choosing and applying a die-casting alloy; and which assure you of prompt delivery when you require it.

Federated products:

Aluminum, Babbitts, Brass, Die Casting Metals, Fluxes, Lead and Lead Products, Magnesium, Plating Materials, Solders, Type Metals, Zinc Dust



Skill makes them look good! Good metal makes them STAY GOOD!

Even if the alloy you buy casts correctly, brings out fine detail and takes a good finish, you may not be getting the consistent quality you think you are.

Minor variations in certain ingredients can change the characteristics of any alloy. If your die casting is a working part this can be critical. Toughness or strength may not reach the limits you designed for. The safety factor you expected may be missing.

Many people buy Federated die casting alloys because they know every heat is spectrographically and chemically tested to make sure chemical and performance specifications are met exactly. This constant quality check is conducted under rigid procedures developed by ASARCO's Central Research Laboratory, where metal impurities can be controlled to parts per million.

Don't believe loose quality-control claims. Check on them. Your Federated representative will be pleased to tell you why we give you a top-quality product, identical in characteristics, every time you buy from us.

Federated Metals ASARCO

Division of

AMERICAN SMELTING AND REFINING COMPANY

120 Broadway • New York 5, N.Y.

In Canada: Federated Metals Canada, Ltd., Toronto and Montreal

For more information circle No. 30 on the Reader Service Card

inates the possibility of returning the wrong gage to the machine operator. Moved to the desired location by easy-rolling casters, the bench features a vinyl plastic top, 50 foot retractable extension cord, pull-out writing desk, folding seat, and gage drawer.

Circle No. 223 on Reader Service Card

ABRASIVE BELT GRINDER . . . for dry, flat surfaces

A new heavy-duty abrasive belt grinder has been introduced which is especially suited for dry, flat surface grinding, polishing and deburring of castings, die castings, forgings, etc.

Model PD-10, developed by Hammond Machinery Builders, can be quickly adjusted to vertical or horizontal operating position. The steel platen, which can be reversed top for bottom and side for side, offers a working surface large enough to allow parts to contact the entire width of the belt.

The grinder has a multi-v-belt drive, 5 or 7½ HP TEFC motor, and has provision for automatic air or spring belt tensioning. Standard speed is 3800 SFPM.

Circle No. 221 on Reader Service Card

THERMOMETER . . . reads easier

The new straight form stainless steel thermometer, by W. C. Dillon & Co., was developed to provide easier reading in installations where an angle is impractical.

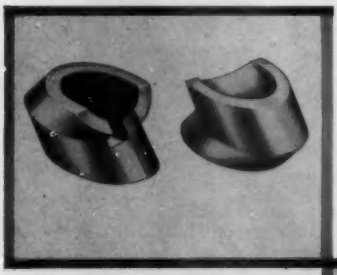
The unit is made in both 3" and 5" head sizes and can be supplied in lengths of 2½" to 72".

Circle No. 224 on Reader Service Card

Basic Considerations in Selecting alloys . . . . for your

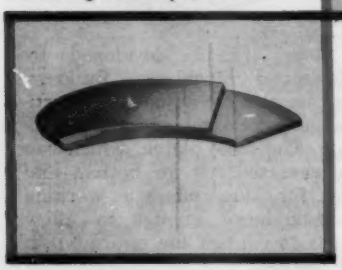
INVESTMENT CASTINGS

DO YOU KNOW THAT . . . an investment casting produced from a low cost metal may be MORE EXPENSIVE than one cast from higher priced material that may also have characteristics better suited to your requirements.



These angle connectors were originally investment cast in mild steel, a low cost material. To overcome corrosion problems, 303 stainless was substituted and because of its better castibility there was no increase in cost. Now, silicon brass is being used at a 10% saving on the original selling price.

This gage mount is an excellent example of unusually good casting characteristics of one metal offsetting a decidedly higher material cost. Originally priced in SAE 8620 steel, it was changed to beryllium copper at a 15% saving in unit price.



This simple textile machine part requires a high degree of wear resistance. Casting in the right metal provided better properties at lower cost than when machined from tool steel.

Get more complete information for this is only a small part of the story telling how the right metal selection for investment castings can often increase efficiency and reduce costs.

WRITE today for Bulletin 116-205 . . . it's FREE!

HITCHINER

Manufacturing Company

MILFORD 7, NEW HAMPSHIRE

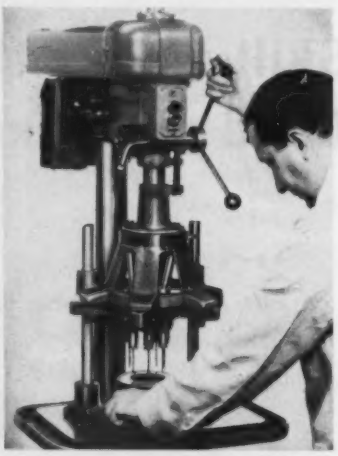
REPRESENTATIVES IN PRINCIPAL CITIES

For more information circle No. 36 on the Reader Service Card

ADJUSTABLE SPINDLE MULTIPLE HEADS

. . . will drill or tap a million combinations

The first two models of a completely new type of Universal Ball Joint Adjustable Spindle Multiple Head has just been added to the Ettco Tool & Machine Co.'s line of small hole drilling and tapping equipment. Both models feature a circle type spindle arrangement, one with 6 spindles



(Model 600) and the other with 8 (Model 800). Both will drill or tap an almost unlimited variety of hole patterns.

The heads, which are shipped ready to attach to any standard drill press, will run at top speed in any operating position in either direction without vibration, regardless of spindle location. Spindles can be quickly added to or removed from the gear case, making it easy to change the number in use as needed. The heads can be quickly located anywhere within a 3" diameter with a 15/16" minimum center distance even while the unit is running.

Circle No. 222 on Reader Service Card

VACUUM INDUCTION FURNACE HEATS TO 1700C

. . . has 12 pound capacity

Model 2551-B furnace can be used for sintering, brazing, annealing, degassing and heat-treating, as well as melting and casting. The new model has a tilt pour crucible capacity of 72 cubic inches. The motor generator induction power supply, which is furnished with capacitor bank and necessary switchgear, rapidly produces temperatures to 1700 C. or higher. The pumping system

maintains a steady pressure.

Manufactured by the NRC Equipment Corp., the unit is suitable for development and small scale production work. A space of 10′ x 10′ x 8′ high is sufficient for operating and maintenance.

Circle No. 225 on Reader Service Card

DATA IN ADS

continued from page 48

47. Standard Bearings — National Molded Products, Inc. has issued a listing of standard size bushings and bearings carried in stock. Sizes, load data, etc. are furnished.

50. Dies By Hobbing — are said to reduce tooling costs. How, when, and why to hob is told in an informative booklet from Newark Die Hobbing & Casting Company.

51. Mold Spotting Press — The one man operation of a new mold spotting press is presented in technical literature from The Palfy Die & Mold Co.

53. Increased Production — per man hour is the outstanding feature of PMD automated molding equipment. Technical information on this, and the many other features of PMD molding equipment are discussed in a new reference catalog from Permanent Mold Die Co.

57. Vacuum Die Casting — Information is available on "Vacufeed"; a new vacuum die casting system for aluminum which features fully automatic feeding, from Reed-Prentice Corp.

58. Powdered Metal Parts — in a range of metals are illustrated in a folder from Reese Metal Products Corp., showing their powder metal facilities.

59. Iron Powder — Information is available from Republic Steel Corp., on their line of powders with the controlled dimensional factor process of manufacturing. Technical data is included on test evaluations, chemical composition and physical properties.

60. Die Cost Savings — Data sheets available from Richard Tool & Mold Co. describe savings of up to 70 percent on zinc and aluminum die casting with the use of standard "Master Mold" cavity blocks.

61. Die Lubricant — Die Slick Bulletin 33X, from G. W. Smith & Sons, Inc., Provides detailed information on 33X. Die Slick, a compound that is excellent for die temperatures around 600 degrees.

64. Melt Any Metal — A complete catalog is offered by the Stroman Furnace & Engineering Co. describing Stroman's line of furnaces for the melting of brass, bronze, aluminum, magnesium, and grey iron.

66. Zinc Alloy Hardeners — Complete details available from U. S. Reduction Co. on two new hardeners for use with No. 3 and No. 5 zinc alloys.

67. Fire-Resistant Hydraulic Fluids — are discussed in the booklet, "Ucon Hydrolubes Spell Safety," from Union Carbide Chemicals Co. The results of laboratory tests and actual service records are presented along with information on the ease of conversion to these fluids.

68. Die Casting Die Steel — Complete information on Thermold AV, a superior grade of die casting die steel, is contained in an illustrated brochure from Universal-Cyclops Steel Corp.

70. Strip Chart Recorder — Bulletin M, from West Instrument Corp., describes a tubeless electronic potentiometer strip chart recorder for recording and controlling such variables as temperature, speed, strain, and pH.

Continued on next page

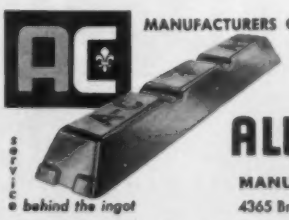
...ACcent on quality

It requires skill to produce quality diamonds.

Skill is also required to produce quality aluminum alloys. That's why foundries and die casters rely on AC quality ingots to produce quality castings.

Everyone knows that a perfect diamond commands a premium price. Yet AC alloys have a similar perfection, but unlike the diamond, you pay no more for AC quality.

We suggest you try a sample order and learn first hand why our motto stresses "service behind the ingot".



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DATA IN ADS

continued from page 85

71. Metals Pilot Plant — where you have the facilities to place your new metal ideas and developments to scale them up under proved production conditions, is presented in booklet B-6570 Westinghouse Electric Corp.

72. Non-Ferrous Finishing — Detailed laboratory and engineering reports on the finishing of non-ferrous metals by the "Iridite" process are available from Allied Research Products, Inc.

73. Barrel Finishing — A 52 page handbook provides a complete description of the most advanced modern processes. Photographs, data and cost comparison charts are included in this handbook from Almco, Div. of Queen Stove Works, Inc.

74. Chromate Treating — Data sheets and prices are offered by The Chemical Corp. on their complete line of Luster-on Powders: zinc, cadmium, copper & brass, aluminum & magnesium.

76. For Precision Painting — A 20-page book shows the different types of spray masks offered by Wm. M. Fiore, Inc. The book gives case-study illustrations of their use in decorating plastics, stampings, and die castings.

78. Specialized Buffs — Bulletin B-102, from Hanson-Van Winkle-Muning Co., presents a new process which impregnates the entire Ruff-L-Buff with the same organic binder used in buffing compounds. The advantages of this and other specialized buffs are presented.

79. Abrasive Coating — "Setting Up Metal Polishing Wheels and Belts" is the title of an informative book from Norton Abrasives. Information on the various types of Alundum grain are presented along with detailed information on the best ways to prepare wheels with cement or glue.

80. Metal Cleaners — A 48-page illustrated booklet from Oakite Products, Inc. tells how to cut cleaning costs in aircraft production. Typical topics are; "How to clean aluminum before anodizing," "How to install cleaning tanks and spray washing machines," etc.

81. Magnesium Dust Control — The "wet method" of magnesium dust collection and control is the best, according to a brochure from Peters-Dalton, Inc. Detailed information is given on the safe collection of dust, fine chips and fumes when processing and finishing non-ferrous metals.

82. Barrel Finishing — and mechanical finishing processes are presented and illustrated in a new, technical data, folder from Roto-Finish Co.

83. Aluminum Conversion Coating — Technical details are available from Turco Products, Inc. on "Turcoat 4178," an aluminum surface conversion coating formulated to stop aluminum corrosion, insure paint adhesion, and give ornamental finish to nonferrous castings.

85. Casting Processes — The metallurgy of Aluminum, as applied to die casting, permanent mold casting, shell mold casting and sand casting, is covered in a new brochure from Aluminum Foundries, Inc.

21. Investment Castings — "Crucible Accumet Investment Castings" is the title of a booklet describing the advantages of this precision casting process from Crucible Steel Co. of America.

48. Iron Powders — Technical data and a working sample are available from Plastic Metals Div., National-U.S. Radiator Corp., on their 10 standard compacting grades of iron powders.

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H. K. PORTER ACQUIRES CLEVELAND HARDWARE

H. K. Porter Co., Inc., of Pittsburgh, Pa., extended its operations in the precision castings field with the recently announced purchase of The Cleveland Hardware and Forging Co., a producer of zinc and aluminum die castings.

The Cleveland Ohio company, founded 76 years ago, is a well known manufacturer of automotive and commercial hardware die castings. Since its acquisition by H. K. Porter, it is known as the Cleveland Division, H. K. Porter Co., Inc.

Supervising operations in the 210,000 square foot plant is Herbert E. White, General Manager of the new Division. White was former president of Cleveland Hardware and Forging.

Divisions of the H. K. Porter Co., Inc. with an interest in the die casting industry are such organizations as Riverside-Alloy Metal and Vulcan Crucible Steel.

SMITH JOINS COMCO, INC.

COMCO, Inc., division of Enthone, Inc., New Haven, Conn., a subsidiary of American Smelting and Refining Company, has announced the appointment of Avery Smith as Assistant to the General Manager, Mr. J. J. Martin, Jr. Mr. Smith will assist in the preparation of proposals for plating room equipment such as plating tanks, barrels, plating racks, polyvinyl chloride exhaust systems and fabrications and will fulfill a liaison function between customers' requirements and Comco facilities.

Mr. Smith was formerly associated with the engineering department of American Machine and Foundry Corporation, Deep River, Conn.

WAGNER OPENS BRANCH OFFICE IN EAST

Eastern users of automatic plating machinery, allied equipment and chemicals will now be able to make direct purchases and obtain technical assistance through a new office branch established in New York by Wagner Brothers Inc., Detroit.

The new office, at 109 Baker Street, East Syracuse, N. Y., according to F. M. Mansfield, vice president of sales, will cover all of New York state and northern Pennsylvania. Its operation will be directed by Tom Kohler, newly appointed district manager.

Kohler was a sales engineer in Wagner's main office in Detroit.

ADMINISTRATIVE CHANGES AT WHEELABRATOR CORP.

Top-level administrative changes were made at the Wheelabrator Corporation, Otto A. Pfaff, president, said.

James F. Connaughton was elected to the new post of executive vice-president. Harold M. Miller was advanced to senior vice-president. Jacob A. Schmidt, Jr. is now secretary-treasurer. John M. Wolf was appointed controller. Edward T. Sullivan was appointed assistant secretary-assistant treasurer.

Officers who were re-elected are Verne E. Minich, honorary chairman of the board; Otto A. Pfaff, president; Leslie L. Andrus, vice-president; and Stanley F. Krzeszewski, vice-president.

The executive committee is composed of: Leston P. Faneuf (chairman), Otto A. Pfaff, James F. Connaughton, R. Sherrad Elliot, Jr., Albert Fink Milton, and Walter A. Yates.

Other directors include Verne E. Minich, Harold M. Miller, Leslie L. Andrus, David M. Milton, Albert M. Austin, Ray P. Whitman, and Page Hufty.

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■ Typical of the many cost saving die castings produced by ACCURATE are these electroplated corrosion-resistant zinc die castings which were used to manufacture a more efficient and eye appealing reel-type jalousie operator. Since the castings have a smooth non-porous surface and are held to close tolerances, they were used as-cast, thus eliminating costly secondary operations. In addition, the dimensional accuracy of the five spur gears and mounting posts permitted fast trouble-free assembly and lowered unit cost. Finally, to lock the component parts into a permanent dust-proof assembly five spinning or penning operations of the die cast metal were performed to eliminate the use of all fasteners.

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VACUUM SINTERING

continued from page 45

same type of copper powder; however, the powder was reduced for several hours in hydrogen at 500°-600° F, and showed a "clean" surface before being compacted. Compacting and sintering conditions for the reduced copper were identical with those above described. The results of these tests are shown in Figs. 3a and 3b, again in terms of constant densification factor, σ, on a plot of log t vs. $\frac{1}{T}$ These curves, however, are entirely different from that shown in Figs. 2a and 2b for the unreduced powders. It is at once evident that these curves have a pronounced positive curvature, and cannot even approximately be represented as straight lines. This fact indicates that the densification of the pre-reduced copper powder compacts can no longer be described as a rate process governed by a single well defined heat of activation.

The situation may be generally described by stating that the value of Q (the molal heat of activation) increases during sintering, the effect being much more pronounced in the case of pre-reduced copper powder. For the latter case the values of Q for a sintering time of ½ to 1 hr. may be evaluated from the graphs of Figs. 3a and 3b to be about 31,000 cal/mol for vacuum sintering, and about 46,000 cal/mol for hydrogen sintering. These values are much lower than those obtained from the straight line approximations of Jordan and Duwez which were 128,000 cal/mol for vacuum sintering and 80,000 cal/mol for hydrogen sintering. The effect of pre-reducing therefore has been to reduce considerably the value of Q at relatively short sintering times. This result is quite reasonable, for the oxide film must impede densification to a degree which is at first large, and decreases progressively as the film is punctured and broken up. It is also of interest to note that for pre-reduced powder Q is lower in hydrogen sintering than in vacuum sintering (for longer time as well as for the short-time values given above), whereas the reverse is true for powder not prereduced.

The effect of vacuum sintering vs. sintering in a reducing atmosphere for a single component metal powder compact cannot be described in a simple manner, inasmuch as it depends on the surface conditions of the powder. All that can be stated is the fact there is considerable variation in activation energy which determines the rate of sintering, and this depends strongly on the sintering atmosphere.

BIBLIOGRAPHY

1. Ellefson, B. S. and N. W. Taylor
   SESSILE-DROP METHOD FOR DETERMINING TENSION AND DENSITY OF VISCOUS LIQUIDS AT HIGH TEMPERATURES
   J. Am. Ceram. Soc. *21* (6) 193-205 (1938)
2. Hausner, H. H.
   THE FORMATION OF A METAL FROM ITS COMPOUND DURING SINTERING
   Powder Met. Bull. *6*, 41-3 (1951)
3. Hausner, H. H.
   GRAIN GROWTH DURING SINTERING
   in "Symposium on Powder Metallurgy", Special Report No. 58, Iron and Steel Inst.

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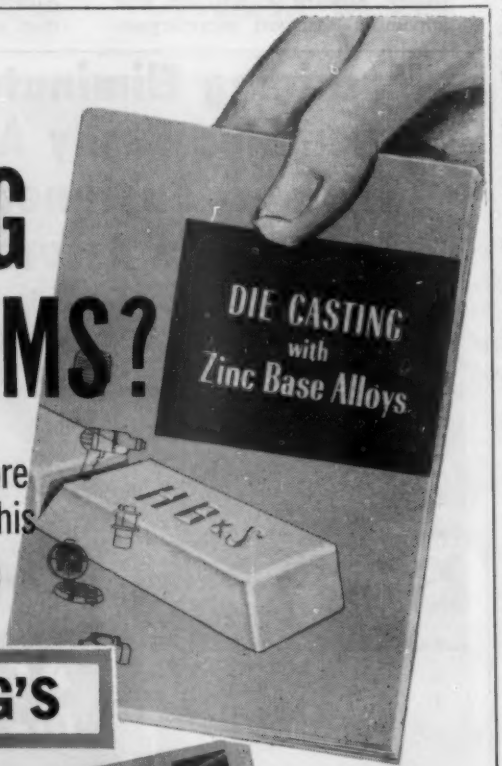

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(London) (1954) p. 102
4. Hausner, H. H.
FUNDAMENTALS OF METAL-CERAMIC COMBINATION (CERMETS)
Del. at Am. Soc. for Metals Conf. on Heat Tolerant Metals for Aerodynamic Applications, Albuquerque, N. Mex., Jan. 28. and 29, 1957. To be published.
5. Hausner, H. H. and H. S. Kalish
POWDER METALLURGY OF ZIRCONIUM.
in "Metallurgy of Zirconium", ed. by B. Lustman and F. Kerze, Jr. McGraw-Hill, New York, 1955, p. 280
6. Hausner, H. H. and N. P. Pinto
THE POWDER METALLURGY OF BERYLLIUM
Trans. ASM *43*, 1052-71 (1951)
7. Hedvall, J. A.
REACTION MECHANISMS IN POWDER REACTIONS
Trans. Chalmers Tek. Hoegskolas No. 15 (1942)
8. Hedvall, J. A.
THE REACTIVITY OF SOLIDS AND ITS ROLE IN POWDER METALLURGY
Arch. Metallkunde *1*, 296-308 (1947)
9. Humenik, M. and W. D. Kingery
METAL CERAMIC INTERACTIONS
J. Am. Ceram. Soc. *36*, 403-9 (1953); *37*, 18-23 (1954)
10. Jordan, C. B. and P. Duwez
THE DENSIFICATION OF COPPER POWDER COMPACTS IN HYDROGEN AND IN VACUUM
Trans. AIME J. Metals *1*, 96-9 (Feb. 1949)
11. Jordan, C. B. and P. Duwez
THE DENSIFICATION OF PRE-REDUCED COPPER POWDER COMPACTS IN VACUUM AND IN HYDROGEN
Trans. AIME *188*, J. Metals 2, 943-4 (1950)

CARLSON ADVANCED BY OAKITE PRODUCTS CO.

Edward L. Carlson, advertising manager, Oakite Products, Inc., has been named director of publicity. Carlson will assume the new duties in addition to his present ones in advertising. In his new capacity Mr. Carlson will be responsible for all company information services, trade shows, special promotions, advertising and publicity.

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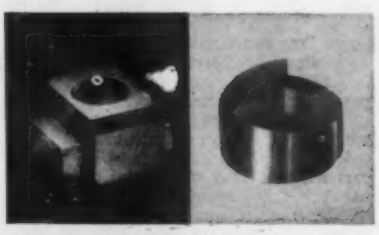
A competent group of Bunting Sales Engineers in the field and a soundly established Product Engineering Department put at your command comprehensive data and facts based on wide experience in the designing and use of Cast Bronze and Sintered Powdered Metal Bearings and parts.



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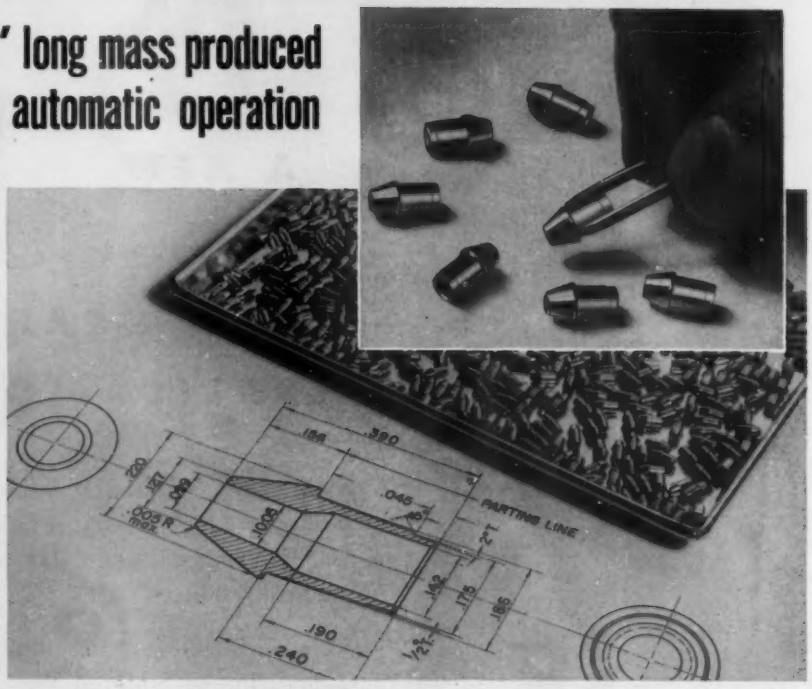

This tiny bushing is used in a ball point pen. Overall it is .390" long and .220" wide. It was formerly made on screw machines, but Gries Reproducer Corporation was able to die cast it in zinc alloy in a single automatic operation reducing the cost to little more than $2.00 per thousand. In addition to lowering costs substantially, GRC exclusive methods guaranteed the perfect uniformity of each individual piece in the million part run. The manufacturer also took advantage of GRC's service to their customers on secondary operations and had the part nickel plated.

Not only in this case, but in many others in which both commonplace and extremely intricate parts were involved, Gries unique patented die casting techniques have made possible exceptional savings and broad flexibility in design.

A fact-filled die casting bulletin, yours for the asking, is put out by GRC explaining their exclusive methods and showing how Gries has helped solve problems on parts "no bigger than your thumbnail" (maximum is 1¾" long, ½ oz., no minimum).

Special Design Wing Nuts to Meet Unusual Needs Now Stocked by GRC

GRC lists in a recently issued catalog sheet the complete specifications on their wide assortment of special design Wing Nuts—High Wing, Round Wing, Low Wing, Low Low Wing and Special Low Wing styles—in a wide range of blank and thread sizes. Also cataloged are Senior, Junior and Economy Type Wing Nuts with plain or serrated bases. In all, more than 100 separate types are listed.

Fastenings are die cast in zinc alloy in quantity to assure uniformity and keep prices low thru GRC's unique techniques.

This new catalog sheet and catalog sheets on their round head thumb and cap nuts, wing and round head thumb screws, rivets, etc., available direct from Gries Reproducer Corp.

Small Gears Pinions, Hubs, Shafts, etc., Available Individually and in Various Combinations from Stock Dies

GRC issues a catalog sheet listing more than 40 individual items and stock sizes of gears, pinions, hubs, shafts, etc., available individually and in various combinations. All items listed are automatically die cast of zinc alloy . . . all combinations are made in one piece. Holes, shafts, spacers, shoulders, etc., are to order and no extra tool charge is made on quantities.

Gries Reproducer Corp. will also die cast in zinc alloy on special order unusual shapes, meet extra precise requirements, in quantities from 50,000 to millions. Prompt quotations on special orders will be made upon receipt of blueprints or specifications. Stock catalog sheet will be sent on request

Be sure to see GRC at the Metal Show Booth 1343

Helpful New GRC Kit is Big Aid to Product Designers

Gries Reproducer Corp. has developed a new kit for designers and production men. Its purpose is to acquaint them with the almost unlimited scope in small parts design and the tremendous savings which GRC exclusive methods make possible.

The kit concentrates in one unit informative data on the extent and flexibility of these unique processes; including one-piece zinc alloy die castings, "Intercast" movable, multiple element units, nylon and other plastic moldings, standard components; fastenings (wing and round-head thumb nuts and screws, cap nuts, rivets, etc.), gears and pinions, toy parts, miniature novelties, nylon screws and coil bobbins.

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FORTY NATIONS SEND OVER 500 CONFEREES TO 39th METAL EXPOSITION

More than 500 conferees from 40 countries will attend simultaneous conventions of the Second World Metallurgical Congress and the 39th National Metals Exposition in Chicago, Ill., in November.

Meetings, panels, and sessions begin Saturday, November second and extend through Friday, November eighth.

More than 170 technical presentations will be given, according to W. H. Eiseman, secretary general of the World Metallurgical Congress. Eiseman is also Managing Director of the National Metals Exposition which will be held in the Chicago International Ampitheatre.

The American Society for Metals will present 129 papers and discussions. Fifty of these will make up the technical program. The Atomic Energy Commission will present 42 papers and discussions on thorium, welding, and metallography. There will be 20 seminars on the characteristics of metals. Current metal-problems of most importance will be probed and discussed at sessions of the 17 international panels made up of 120 scientists from America, Canada, and overseas. Meetings will be held at the Palmer House and Hotel Sherman.

Twenty-two seminars, symposia, and papers will be sponsored by the Metals Division of the American Institute of Mining and Metallurgical Engineers. Ten major sessions in three days are scheduled at the second international conference of the Society for Non-destructive Testing. Both will be held at the Hotel Morrison. The Industrial Heating Equipment Association will present six papers, and the Metal Powder Association will give three at their sessions slated for the Palmer House.

Three papers will also be given by the Special Libraries Association at locations which will be specified later.

SCHEDULE FALL I.C.I. MEETING NOV. 19-21

The Investment Casting Institute will hold its annual fall meeting at the Sheraton Hotel in Chicago, November 19-21.

Committee meetings will be held on November 19th, with the technical session scheduled for November 20th, and the business session on November 21.

Included in the technical program will be a discussion of the advantages and disadvantages of induction melting and carbon arc melting of high alloy steels by L. J. DiNuzzo, of General Electric's foundry department.

As a special feature, Dr. N. J. Grant of Massachusetts Institute of Technology will review his recent trip and tour of Soviet steel mills in Russia and Siberia.

Presentations to be made by subcommittees of the ICCI's Process Materials Committee will include a demonstration of standardized test procedures for determining the physical properties of proprietary investments by T. E. Moore, manager of Ransom and Randolph Co.'s Industrial Division; a demonstration of test procedures on pattern materials by Paul Solomon, sales engineer of the Yates Dental Mfg. Co.; and a paper on low melting plastic pattern materials by Dr. Charles

Continued on page 92

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Precision is a much misused word, but here at Phoenix, when we talk "Precision", it means just that. It means very close tolerances, it means extra close inspection of every piece produced, it means a completely acceptable job for our customers.

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Gears, pinions, cams, ratchets, bearings and bushings, machine and structural parts.

SPECIAL, high speed rotary presses available for high quantity, small part production

I. C. I. MEETING

Continued from page 91

J. Marsel, New York University.

Chairman of the Technical Session Program Committee is W. I. Matthes, executive vice president of the Arwood Precision Casting Company.

The business session, under the chairmanship of P. W. Schipper, manager of the Investment Casting Division, Howard Foundry Co., will be highlighted by a number of topical papers. Production control will be the subject of a talk by Robert H. Roehl, production control supervisor, Howard Foundry Co. Industry growth trends will be reported by Nobi Takahashi, director of Industry Statistical Analysts. The problems in acquiring and training operating supervisory personnel for investment casting operations will be analyzed by K. H. Pierce, sales manager of Precision Castparts Co. And, a special analysis of industry sales promotion activities will be presented by Henry F. Eaton, of Dix & Eaton, ICI public relations counsel.

A review of the past year's activities will be made at the business session by K. W. Thompson, president of the Institute.

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COLWELL NEW VICE PRES. FOR APEX SMELTING

Donald L. Colwell

Donald L. Colwell has been elected vice-president in charge of laboratories and research for Apex Smelting Company, it was announced by the board of directors recently.

Colwell was formerly director of laboratories for Apex Smelting and has been associated with the company for 12 years.

Colwell has been active in technical society work having been chairman of the Chicago chapter, American Society for Metals; chairman, Chicago section, American Institute of Mining and Metallurgical Engineers, and chairman, Chicago district, American Society for Testing Materials, from whom he has just received the award of merit. He is chairman pro-tem of the proposed new division on die casting and permanent mold of the American Foundrymen's Society. He is the author of many technical articles on die casting and aluminum casting alloys.

* * *

ROST JOINS FRANKLIN

E. J. Rost

The Franklin Oil & Gas Company has announced that Edward J. Rost has joined their sales force as lubrication engineer.

Rost has been associated with the oil industry in a sales capacity for the past seven years. In his new position he will continue to call on industrial concerns in the Northeastern Ohio area.

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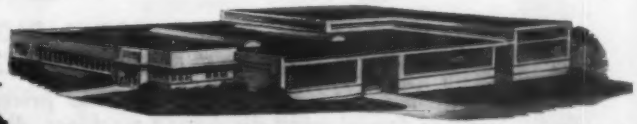
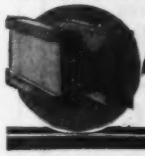
Yes, the folks at Milwaukee have learned a lot in these many years of continuous service to industry in the design and production of die cast components for all kinds of products. When you come to Milwaukee for your die castings, their experience is yours at no extra cost.

Backed by the facilities of its modern plant, Milwaukee offers you Complete Die Casting Service to help you realize more fully than ever, *all* of the benefits of the die casting process.

Milwaukee operates under the Certified Zinc Plan of the American Die Casting Institute.





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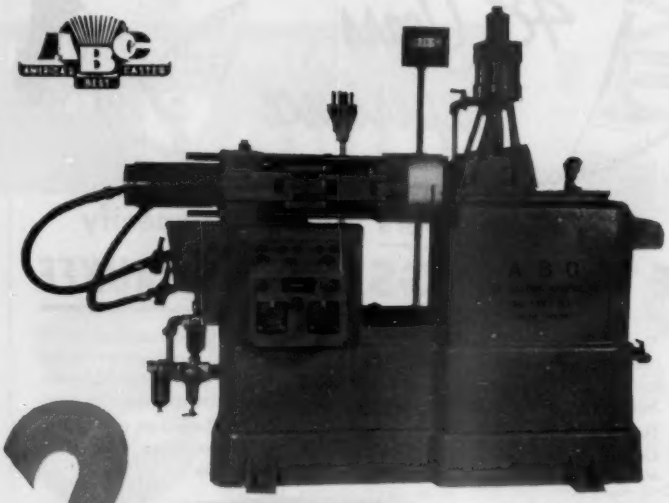

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jobs & equipment

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Custom fabricator of powder metal parts expanding sales organization. Seeking representatives in Indiana; Illinois; and Michigan. Must have compatible lines. Include experience, current lines, and size of organization in reply. Box No. 8557.

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Aluminum Cold Chamber Attachment for REED-PRENTICE Model ℄1½, year 1947. Complete with Furnace. Factory Built-Reasonable. Write Box No. 10257.

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1. 400 Ton Cleveland aluminum or magnesium cold chamber machine, hydraulic ejection 2000# shot end, 17" stroke, spare piston and shot cylinder, 1950 model in good condition. Reasonable.
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3. 25 Ton Denison hydraulic trim press, 20" stroke, Model KA 25, 15 H. P., 24" x 25" bed, 29" daylight.
4. Hannifin air press, 5" air cylinder, 12" x 24" bed.
5. Gardner double wheel grinder, 20 H. P., 30" grinding wheels and two separate 5 H. P. feed motors. Box No. 10457.

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EXCELLENT BUYS **PRICED RIGHT**

1 Cleveland G & N 300 ton Aluminum Die Casting Machine. 3½ lb. shot. Excellent Condition.

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PM-54

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PLASTIC METALS

Division

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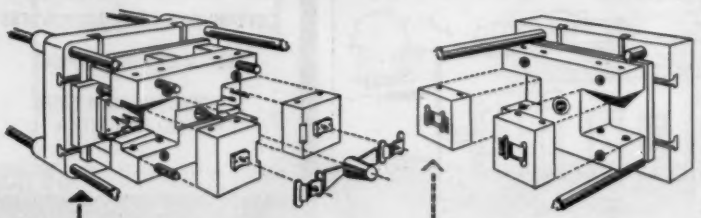

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DESIGNERS AND BUILDERS OF FINE TOOLING

For more information circle No. 60 on the Reader Service Card

WEEKLY HEADS WESTERN DIV., MACDERMID, INC.

MacDermid Incorporated, Waterbury, Connecticut and Detroit, Michigan manufacturer of metal cleaning, plating and finishing chemicals, recently announced the opening of a West coast division, MacDermid Pacific Incorporated.

C. E. Weekly

Complete manufacturing, warehousing, sales and service facilities are now in operation. The new division, headed by Claude E. Weekly, former Product Service Engineer, will have its headquarters temporarily located at 18802 Fonthill, Torrance, Calif.

Mr. Weekly has been active in all phases of cleaning, plating and finishing metals for twenty years. At various times in his career he has been a foreman, finishing room supervisor, metal finishing consultant and service manager. He is a charter member of the Indianapolis, Ind., Branch, American Electroplater's Society.

NEW AJAX ELECTRO-THERMIC APPOINTMENTS

At its last regular meeting, the Board of Directors of the Ajax Electrothermic Corporation, appointed A. Dean Meyer, General Manager, to succeed Guilliam H. Clamer, who has held that office since the formation of the company in 1920. Mr. Meyer, who was recently elected Director, has served the Company since 1929 and is also Vice President, having been appointed to that office in 1947. Dr. Clamer continues as President.

William J. Wertz, another 28 year employee, until recently serving as Purchasing Agent and Traffic Manager, was also named Plant Manager.

Thomas J. Turner, who has been working with Mr. Werts in purchasing, was made buyer.

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Produces the World's Most Versatile Copper-base Alloys

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FOR HIGH HARDNESS	ALLOY 250-C	Be—2.60-2.85% Co—0.35-0.65% Cu—Balance
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FOR HIGH CONDUCTIVITY	ALLOYS 55-C	Be—0.55-0.75% Co—2.40-2.60% Cu—Balance
	AND 35-C	Be—0.25-0.50% Ni—1.40-1.60% Cu—Balance

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For more information circle No. 63 on the Reader Service Card

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J. R. McConnell

James R. McConnell has been appointed Manager, Abrasive Sales, Pangborn Corporation, Hagerstown, Md., manufacturer of dust collectors and Rotoblast equipment.

In this new position McConnell will coordinate the newest technical developments in blast cleaning materials with improved customer and field service in the application of abrasives to obtain better cleaning at lower cost.

Mr. McConnell's appointment follows 10 years of experience in the abrasives field.

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use **DILLON**

screw-in thermometers

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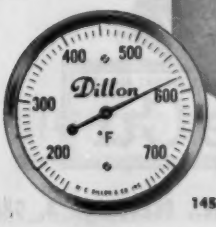

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Los Angeles, Calif. – Toronto, Ont. – Dayton, Ohio

For more information circle No. 26 on the Reader Service Card

fat on the fire

The time is fast passing when you can walk into your stock room and find 20 different die casting compounds brewed by men in the shop. But you may find a great many samples of die lubricants left by manufacturers. Ever wonder what's in them?

In general, today's "miracle lubricant" is tomorrow's dust-catcher, especially if it is mostly fatty oils such as tallow, fish oil, palm oil, lard, cottonseed oil, or hair oil. They have been tried and discarded by virtually all die casters. Yet when one of these organic fats appears in a sample, you can't detect it until it oxidizes rapidly, producing a gummy residue on the die and more than the usual amount of smoke. The artists in this business gave up animal and vegetable fats long ago.

Petroleum derivatives, such as cylinder oil, mineral oil, grease, and solvents, are often found. They make good vehicles, but alone they leave much to be desired, especially if you cast anything more than very simple parts.

Silicone release agents, aside from initial expense, may cause very real finishing problems. Graphite, when used to excess, causes staining. Some pigments build up deposits while others don't; the whole point is that a sample may be nothing more than a collection of ingredients you've already tried and thrown out.

But have no fear. In spite of this chaos Die Slick compounds continue to be used and specified. Die Slick compounds are continually improved; new ones are thoroughly tested before going to market. And even the artists occasionally ask for our advice . . . usually we have something worthwhile to say (if we don't, we say so). Our offer still holds: tell us what metal or alloy you are casting. Try the Die Slick compound we recommend. If it doesn't work we cancel the invoice.

May we hear from you?

Cordially,

V. W. Smith

V. W. Smith

don't scuttle the machine...use Die Slick!

Preventing stuck castings with aluminum is a different problem from keeping your zinc parts free, smooth and clean. A zinc die casting compound may be excellent at die temperatures around 400°, but with aluminum, die temperatures around 600° require a more stable compound. 33X Die Slick meets this need, as proved in more than 10 months of field trial. It works well on magnesium and brass alloys too. 33X can be thinned with 3 or 4 parts kerosene without settling! When thinned beyond this point it will settle only slightly after 24 or 48 hours.

Send for Die Slick Bulletin 33X, or better yet, write for a trial quantity.

Die Slick is a registered trade mark of G. W. Smith & Sons, Inc.

DIE SLICK

used by die casters everywhere

G. W. SMITH & SONS, INC., 1700 SPAULDING ROAD, DAYTON 3, OHIO

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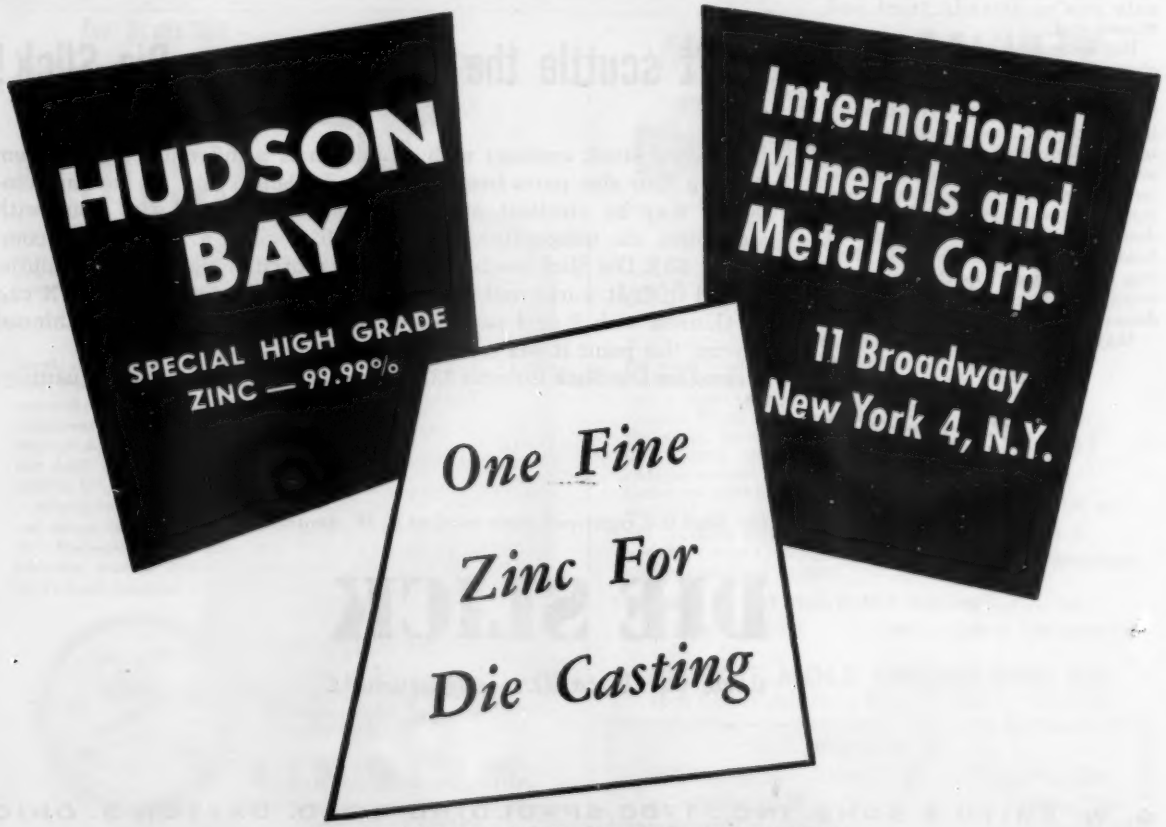

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If it's experience you're after...

call a Hoover Man

Some folks with experience and that certain touch can do the impossible. We aren't making any wild claims about the aluminum and zinc alloy castings we produce. But we've been satisfying our customers—many of them for 35 years. We make quality castings. Make 'em for lots of different companies. Why not call us? We'll have one of our experienced Sales Engineers give you the whole Hoover story.

HOOVER

THE HOOVER COMPANY, Die Casting Division, North Canton, Ohio
In Canada – Hamilton, Ontario

Die Casting specialists since 1922

DIE CASTING *by* HOOVER

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APEX FIRSTS

FIRST IN ZINC DIE CASTING ALLOYS

FIRST in commercial production and sale of the new series of zinc base die casting ingot alloyed from high grade zinc. Production started October, 1924.

FIRST to introduce in 1928, .03 to .05 magnesium. Prior use was .10 magnesium and hot shortness was experienced.

FIRST to use 99.99 plus pure zinc. With the introduction of special high grade zinc in 1928, Apex Laboratory die cast tests proved that lower magnesium prevented inter-crystalline corrosion and also eliminated the hot shortness characteristics experienced with higher magnesium. Apex promoted in 1931 the lower magnesium in the first ASTM specification written for zinc die casting alloys.

FIRST to establish and publish metal and die temperatures, also alloy composition effects through actual die casting of thousands of test bars. Published a series of technical data "Metalgrams" showing these effects, starting in 1931 through 1945.

FIRST to use large capacity refractory lined furnaces for alloying, replacing the conventional iron metal pots. The larger heats established a uniformity of composition not previously attainable. Iron pickup also was eliminated.

FIRST to employ Quantometers—direct reading spectrographs—for rapid and accurate control of alloy composition.

Research leadership back of every Ingot

Apex was a pioneer and continues as a major influence in the development and production of the all primary special high grade zinc base die casting alloys. Apex will continue its research and testing program to improve and produce better alloys. We invite your inquiries and solicit your business.

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APEX SMELTING COMPANY

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